# The Clean Energy Challenges: Sustainability, Decarbonization and Security of Supply in the Euro-Mediterranean Region

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Recent developments, including the unveiling of the EU Green Deal and worldwide repercussions of the Russian conflict in Ukraine, show that the timing is right to rethink and actively accelerate the transition to a low-carbon economy in the Mediterranean region. This makes sense as the EU is a major global consumer, while the southern and eastern Mediterranean (SEM) countries have a vast potential to export energy there in order to respond to increasing needs. Meanwhile, the changing Global Value Chains (GVCs) and the transformation occurring in many sectors are opening up new opportunities,[1] which could lead to reshoring production closer to consuming markets, thereby reducing carbon footprints, digitalizing production and services and channelling investments into green & sustainable projects and processes in SEM countries.

Investments in energy transition can boost GDP growth and create much-needed jobs. In the face of increasing demographic pressure, as well as the progressive degradation of the environment, we urgently need to take action and agree on strategies for the Mediterranean energy transition. Meanwhile, such a transition and the road to decarbonization are becoming increasingly disordered with the energy price crisis of late 2021 and the war in Ukraine. Linking short-term actions to longer-term strategies is thus vital to promoting a sustainable development path. With that in mind, this paper aims to explore key challenges and lessons learned regarding the development of clean energy in the region. It draws from recent CMI analysis (Moreno-Dodson, Pariente-David and Tsakas, 2021),[2] providing thoughts on what SEM countries need to succeed in their energy transition and the priorities to target, as well as measures to promote the integration of the Euro-Mediterranean energy market.

First, we mention that additional actions are needed with regards to the green stimulus, highlighting the huge potential for investment in the region for "greening" specific sectors such as transport, construction or tourism. Second, we argue that the production of green and blue hydrogen would be a very efficient way to contribute to the energy transition, especially considering that the EU Commission is expected to mobilize financing instruments, including in the context of the Neighbourhood Investment Platform. Third, we stress how the introduction of the EU carbon border adjustment mechanism (CBAM) could act as an additional "motivator" for the SEM countries' energy transition, as they would try to avoid additional tariffs on their exports to the EU. Fourth, we mention that regional electricity mar-

[1] See: Augier, Patricia; Moreno-Dodson, Blanca; Blanc, Pierre; Gasiorek, Michael; Mouley, Sami; Tsakas, Constantin; Ventelou, Bruno. *Post Covid-19: opportunities for growth, regional value chains and Mediterranean integration*, CMI and Euromediterranean Forum of Institutes of Economic Sciences (FEMISE), February, 2022.

[2] Moreno-Dodson, Blanca; Pariente-David, Silvia; Tsakas, Constantin. *A Mediterranean Green Deal for an Effective Energy Transition as Part of The Sustainable Post-COVID Recovery*, CMI, Marseille, November, 2021.

ket integration (REMI) could facilitate renewable energy scale-up. A final section offers recommendations, suggestions and the way forward for future research on pressing issues related to the energy transition.

### The Need for Green Stimulus and Investment in the Renewables Sector: Creating Green Growth and Jobs, While Reducing $CO_2$ Emissions

Following the Covid pandemic, governments around the world started using stimulus packages to spur business growth. A little more than a year later, following the war in Ukraine, countries worldwide adopted measures to limit energy price increases for consumers, temporarily delaying coal phase-out and slowing down nuclear shutdowns, while it has become evident that finding new sources of natural gas to replace Russian supplies is fundamental (Pariente-David and Walters, 2022).[3] With the EU in the lead, largely thanks to the RePower Europe plan, it has been acknowledged that energy security and the Green Deal are not incompatible. The main solution could be found in the accelerated deployment of renewables and green hydrogen, as well as in intensifying energy conservation efforts, both based on energy efficiency improvements and behavioural changes. The EU's plan calls for replacing 16%-32% of Russian gas imports with hydrogen before 2030. Other sources of energy such as the regasification of LNG are also being explored.

Some examples of "green support" post-Covid can be found in SEM countries. In Morocco, the national recovery plan "Le Pacte pour la relance économique et l'emploi," plans to enforce the transition to renewable energy and the development of an environmentally-friendly water policy, to promote sustainable tourism, to follow the path of sustainable land use and to preserve biodiversity (Danilina, 2020),[4] while also accelerating the digital economy. In Egypt, about 691 green projects were already included in its fiscal plan for 2020-21, at a total cost of EGP 447.3 billion ($28.4 billion). Also, Egypt launched its first green bond issue on the London Stock Exchange, worth $750 million for five years, the largest ever in the Middle East and North Africa.[5] While these are welcome efforts, much more needs to be done. For the SEM countries, unlocking a green recovery stimulus that can address the objective of sustainable growth and job creation, while addressing climate change (adaptation and mitigation), presents a huge opportunity.

Financing important energy infrastructure at the national and regional levels represents a considerable challenge, especially in a post-Covid context and considering the limited fiscal space of SEM economies

Overall, policy design will be key for packages to be successful in delivering the much needed social, economic and climate outcomes. Some sectors are to be prioritized in green stimulus packages in all SEM countries, such as, for example, the transport sector.[6] In the Mediterranean region, specifically, maritime transport can be an extremely efficient way of transporting goods and people but, currently, it also releases significant volumes of emissions as by-products, including air polluting sulphur, nitrogen oxides, particulate matter and greenhouse gas. As the European Commission announced in the European Green Deal that GHG from EU transport, including shipping, should be cut by 90% by 2050, one of the core issues that needs to be discussed is how to un-

[3] Pariente-David, Silvia and Walters, Jonathan "From COP26 to COP 27: A Rough Ride across the Mediterranean?" CMI Blog, May, 2022. www.cmimarseille.org/blog/cop26-cop-27-rough-ride-across-mediterranean?fbclid=IwAR02HYFzaRggYvV1fDvK2Hh02cZul7VLYmC2PN-pZ6ODG-ozxj2p7V6L1Xw

[4] Danilina, Vera (2020), "Policy Responses to the Environmental Challenges of COVID-19 in the Southern Mediterranean Region in a Short – and Medium-run Perspective." *CMI-FEMISE COVID-19 Med Brief*, no 8, November.

[5] www.arabnews.com/node/1750726/business-economy

[6] Sieghart Lia and Heger, Martin, "A blueprint for a 'green' recovery from COVID-19 for MENA countries." *World Bank Blogs*, 27 July, 2020. https://blogs.worldbank.org/arabvoices/blueprint-green-recovery-covid-19-mena-countries

leash the potential for maritime transport decarbonization, as a way to upgrade environmental standards in SEM countries.

The renewables sector in these countries harbours opportunities, most notably with regards to solar energy. For instance, right before the pandemic, the Moroccan Agency for Sustainable Energy (Masen) had invited expressions of interest from developers for the first phase of its 400MW Noor PV II solar programme. However, while the timing is right to revive the renewables sector and to increase integration of Mediterranean energy markets, we should also keep in mind that financing important energy infrastructure at the national and regional levels represents a considerable challenge, especially in a post-Covid context and considering the limited fiscal space of SEM economies. Meanwhile, the SEM region still represents additional risks for investors, traditionally associated with macro and political instability, putting a strain on the costs of capital for RES projects.

North Africa, as well as the rest of the MENA region, have been identified as favourable locations to supply Europe with green hydrogen

Overall, a key challenge for SEM governments is how to fund important renewable energy projects. While governments could take on a share of financing for some new projects and for repair/maintenance projects, an effective private sector needs to lead the transformation. In addition, most SEM governments need to create policies, regulations and procedures that encourage private investors. Furthermore, in order to maximize the regional benefit of renewable energy, Mediterranean grids should also be transnational, which will require bilateral dialogue and a regional approach.

### Green (and Blue[7]) Hydrogen: Potential, Incentives and Strategies

When produced with low carbon emissions, hydrogen would be a very efficient way to contribute to the energy transition. The European Union has thus included green hydrogen as part of its plans to meet decarbonization targets. An element of the EU's New Industrial Strategy proposed in 2020 is the new hydrogen strategy, which aims to create an enabling environment to scale-up renewable hydrogen supply and demand for a climate-neutral economy.

The EU recognizes that not all the required volumes can be generated within Europe. North Africa, as well as the rest of the MENA region, have been identified as favourable locations to supply Europe with green hydrogen. It is evident that there are a number of opportunities open to SEM countries, as they could become a possible source for a substantial amount of Europe's future hydrogen supply. However, developing green hydrogen effectively on a wider scale needs an important amount of renewable electricity. Meanwhile, the production of green hydrogen still presents technical and financial issues that need to be addressed. Markets for green hydrogen also need to be developed. The unfolding of a hydrogen economy greatly depends on government investment in the initial phases.[8]

Meanwhile, to support investments in clean hydrogen in the European Neighbourhood, the Commission is expected to mobilize the available financing instruments that include the Neighbourhood in the context of the Investment Platform.[9] However, key

[7] As hydrogen technologies are being considered in post-Covid industrial plans worldwide, it is important to understand how they are codified. The main colours that have been attributed to hydrogen are the following:
– grey (or brown/black) hydrogen, produced by fossil fuels, and causing the emission of carbon dioxide in the process;
– blue hydrogen, through the combination of grey hydrogen and carbon capture and storage (CCS), to avoid most of the GHG emissions of the process;
– turquoise hydrogen, via the pyrolysis of a fossil fuel, where the by-product is solid carbon;
– green hydrogen, when produced by electrolyzers supplied by renewable electricity (and in some cases through other pathways based on bioenergy, such as biomethane reforming or solid biomass gasification);
– yellow (or purple) hydrogen, when produced by electrolyzers supplied by electricity from nuclear power plants.
Within each "colour" there may be a significant variability of carbon intensity.

[8] www.power-technology.com/comment/standing-at-the-precipice-of-the-hydrogen-economy/

[9] https://op.europa.eu/en/publication-detail/-/publication/5602f358-c136-11ea-b3a4-01aa75ed71a1/language-en

issues still need to be discussed and addressed, including identifying regional hydrogen projects and PPPs to export green hydrogen from SEM countries, the role of green hydrogen in renewable energy in connection with the water-food nexus, the incentives that the North can provide to SEM countries for accelerating hydrogen production and the possibility of creating a Mediterranean Hydrogen Alliance.

### The Role of the Carbon Border Adjustment Mechanism (CBAM) and the Right Economic Policy Tools for the Energy Transition

The EU's Fit for 55 package includes a proposal for a carbon border adjustment mechanism (CBAM). The main objective is to prevent carbon leakages and to preserve the competitiveness of Europe's industry, as the region adopts more stringent climate objectives.

The proposed CBAM will affect the exports of various products and equipment according to their carbon content. Under the current proposal, the CBAM system will initially target a selected number of carbon-intensive goods, including cement, iron and steel, aluminium, fertilizers and electricity. This could severely affect the economies of SEMs. Right now, for SEM trade partners, the gradual introduction of the EU's CBAM would essentially mean additional tariffs, which would hinder their exports to the EU. In terms of absolute embedded $CO_2$ emissions in exports to the EU, Libya and Algeria (both with more than 10 million tonnes of embedded $CO_2$ equivalent emissions), followed by Turkey and Egypt, would be among the most concerning. Meanwhile, several non-EU Mediterranean countries are interconnected with the EU power system and already trade electricity regularly with EU countries. According to the current proposals, they would be subject to the CBAM, unless their electricity markets are coupled with those of the EU, they have adopted ambitious $CO_2$ reduction targets commensurate with those of

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Europe, or they are implementing an ETS or analogous carbon pricing measures (CMI, 2021).[10]

The EU has announced that a reporting system will apply as of 2023 for CBAM-related products with the aim of facilitating a smooth roll out and to facilitate dialogue with third countries. Meanwhile, importers will start paying a financial adjustment in 2026. However, in the meantime, it would be essential that our discussions also focus on how to protect SEM countries from potential growth and job losses resulting from the CBAM impact.

### Regional Cooperation and Euro-Mediterranean Energy Market Integration

Regional electricity market integration (REMI) has always been known to offer numerous benefits to the power systems and economies of participating countries: enhanced energy security and power system reliability, reduced need for back-up capacity thanks to reserve sharing, supply mix diversification, more efficient use of power plants, lower power system costs (both investment and operating), and therefore expected lower consumer prices.[11] However, with more ambitious climate mitigation objectives in the EU, the climate benefits of REMI are increasingly acknowledged as being as important, if not more so, as the energy and economic benefits. Some of the climate positive externalities result from the increased efficiency of the power system due to regional integration; but most of them are derived from the fact that REMI facilitates renewable energy scale-up.

[10] Moreno-Dodson, Blanca; Pariente-David, Silvia; Tsakas, Constantin. *A Mediterranean Green Deal for an Effective Energy Transition as Part of The Sustainable Post-COVID recovery*, CMI, Marseille, November. 2021. www.cmimarseille.org/sites/default/files/newsite/energy_report_final_final_online_0.pdf

[11] World Bank. *Regional Power Sector Integration: Lessons from Global Case Studies and a Literature Review*. Energy Sector Management Assistance Program (ESMAP); Brief note 004/10. Washington, DC, 2010.

REMI facilitates the large-scale development of renewable energy (RE), by improving power system flexibility and optimizing investments. According to the International Energy Agency (2014), flexibility is "the ability of a power system to reliably and cost-effectively cope with the variability and uncertainty of demand and supply across all relevant timescales, from ensuring instantaneous stability of the power system to supporting long-term security of supply." Two key solutions to increase flexibility are storage (batteries, thermal storage, pumped hydro, etc.) and, especially, regional market integration through interconnections.

As discussed before, the EU Green Deal and Recovery Plan emphasize the need for cooperation, partnership and REMI to achieve the goal of climate neutrality at the lowest possible cost. Regional cooperation, coordination of national policies and of power system operations and REMI are also a central part of the EU "Clean Energy for All Europeans" (CE4ALL) Package.[12] Broadening regional electricity market integration to include the southern and eastern shores of the Mediterranean would make the EU goal of reaching carbon-neutrality easier to achieve and less costly, as it would give Europe access to a vast almost limitless reserve of carbonless energy. An integration of the Euro-Mediterranean energy market would have benefits for both northern and southern countries, both in the short term and in the long term, by allowing the optimization of resources and infrastructures, as well as reducing income disparities between the two shores of the Mediterranean.

## Conclusions and Recommendations

**1.** The Green Deal sets out for the EU to use trade and investment policy, and build partnerships with its neighbours. The EU's Fit for 55 package is a central global blueprint for converting climate ambitions into innovative policies, including in cooperation with its southern and eastern neighbours. However, substantial progress cannot be expected without efficient and trusted communications, in-depth pedagogy and long-term technical assistance, which would generate ownership and a broader consensus among SEM countries, enabling them to align with the EU Green Deals' ambitions.

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**2.** There is a clear need to generate knowledge that provides a comparative analysis of countries' hydrogen strategies, which would provide a more in-depth view regarding advancements in SEM countries, investment potentials, bottlenecks and recommendations moving forward. This is more relevant than ever following the repercussions of the war in Ukraine. Furthermore, there is also a need to generate knowledge on efficient transportation and logistics in the Mediterranean, including an assessment of the green investments needed. One needs to answer questions such as: What could the main decarbonization pathways be for Mediterranean maritime transportation to align with the European new Green Deal? What technical and operational strategies could be put in place to reduce fossil fuel consumption? What is the cost of inaction for SEM countries? How can regional cooperation contribute to shipping decarbonization? Last but not least, additional research is needed on the impact that the CBAM will have on SEM countries' growth and employment.

**3.** The massive RE scale-up necessary to reach the objectives of the Paris Agreement requires a propitious policy framework and market organizations that encourage the flexibility power systems need to integrate a high level of renewables. Euro-Mediterranean energy market integration provides that enabling environment. Developing a green integrated energy market requires:

[12] European Commission, Communication from the Commission, Clean Energy for All Europeans, COM(2016) 860 final

- *The massive development of renewables*: this is already happening, as RE costs are falling rapidly. Accelerating that trend even further requires policies that support the development of RE projects. Most of those policies are developed at the country level. However, regional policies to support this process are still needed, such as, for example, harmonizing regulations, cross-country auctions for large new RE power-generating projects (as are developing in Europe under the Renewable Energy Directive), and creating an enabling framework for cross-border Corporate PPAs.
- *The development of the necessary physical infrastructure*: in order to enable energy trade across and around the Mediterranean, in support of energy market integration, additional physical infrastructure may be needed. However, those are costly investments, and they should be undertaken using a solid cost-benefit approach. The first phase is to identify what interconnectors and pipelines are required. To avoid stranded investment and take into account the increased interlinkages between the electricity and gas systems, the planning should be undertaken jointly for electricity and gas infrastructure, as is done now in Europe by ENTSO-E and ENTSO-G, when they prepare joint scenarios for use in their Ten-Year Network Development Plans (TYNDP).
- *The harmonization of market design and the interoperability of networks*: it is not enough to have physical infrastructure to ensure that regional market integration will be effective and energy trade can take place unhindered. Market design in different countries needs to be aligned so that electricity can flow across borders in the most efficient way. The network codes also need some harmonization to ensure the system's reliability and stability.
- *Regulatory convergence*: collaboration and some harmonization at the regional level of regulation are required, so that a regional market can function and regional integration can become a reality. In particular, the allocation of cross-border transmission capacity needs to be defined, as well as the cost of such allocation. Most SEM countries still do not have energy regulators in place, but regulation at the regional level can help the process of preparing harmonized national regulations.
- *Appropriate governance*: institutional support at the regional level will be needed to coordinate the national entities and ensure efficient operation of the regional energy market. Under the auspices of the European Commission and the Union for the Mediterranean, institutions have been established to enable the coordination and cooperation of Mediterranean stakeholders, in particular the Association of Mediterranean Transmission System Operators (Med-TSO) and the Association of Mediterranean Regulators (MEDREG). The creation of Regional Coordination Centres (RCC), modelled on what is proposed in the EU Governance Directive, is under consideration.[13] Additional institutional support might be needed as the hydrogen market develops.

A harmonized guarantee of origin system for the Euro-Mediterranean area is necessary to create an integrated energy market where green energy can move freely

- *A regional green certification system*: when European countries buy electricity or gas from countries on the south and east shore of the Mediterranean, they need proof that they are buying decarbonazed energy. A harmonized guarantee of origin system for the Euro-Mediterranean area is necessary to create an integrated energy market where green energy can move freely.
- *Positioning as a front-runner in hydrogen, including the preparation of a regional strategy to establish a Mediterranean hydrogen market*: the Mediterranean region is both a region with

[13] MEDREG (2021), Regional Integration: sub-regional regulatory convergence

a potentially high demand for hydrogen and with a high supply potential, given its huge renewable potential. A local market already exists in countries with a large phosphate sector and with a refining industry. In the medium run, new demand could develop for shipping and in the cement, steel and other industries. The development of a hydrogen sector could also contribute to flexibility in the electricity system, enabling a massive RE development. Hydrogen transport infrastructure could be initially established through existing natural gas pipelines, before dedicated pipelines are developed. Trading hubs could be created at industrial ports, which are major hydrogen demand centres, as well as nodes of transport infrastructure. Creating a Mediterranean Hydrogen Alliance, including European and MENA Hydrogen Alliances, would gather all the stakeholders to define the Euro-Mediterranean strategy, and then implement it.

**4.** Last but not least, energy transitions are primarily about people. From a social perspective, the energy transition can first and foremost expose SEM countries to the risk of abrupt shocks in their primary sectors and in their labour markets. If parallel sector policies are not implemented in a timely fashion, the SEM region runs the risk of being left with outdated/low skills for their human capital, low mobility and low diversity in the labour markets, and poor job prospects. There is therefore an opportunity to couple their energy transition with policies and initiatives that induce an inclusive labour transition. Specifically:

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- Policies need to clearly define the targets to be met, the end beneficiaries, and the present and future capacity of the domestic economy to meet evolving needs.
- SEM policymakers could promote legislation that contributes to the transition towards renewables, such as eliminating fossil fuel subsidies, and introducing carbon pricing measures.[14]
- The energy transition also calls for overcoming systemic weaknesses of human capital and technology, such as a lack of scientific approaches, engineering knowledge and cross-cutting skills. It is recommended that SEM countries identify and implement education policies that address skill gaps, gender inequality and industry needs for specific cross-cutting skills. North-South collaboration will also be needed to achieve these goals.





[14] UNEP and Inter-Parliamentary Union (2020), "Green approaches to COVID-19 recovery: Policy note for parliamentarians." available at :www.unep.org/resources/report/green-approaches-covid-19-recovery-policy-note-parliamentarians