MEDITERRANEAN ENERGY PERSPECTIVES

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

The Mediterranean has been a historical cradle of empires, civilizations, and religions for millennia. Today, accounting for 7% of total World energy demand, the Mediterranean energy demand continues to rise, driven by population growth of 4 million people per year, and the spread of prosperity which is increasing the consumption of commercial energy. Large-scale wind and solar farms are providing ever increasing volumes of electricity throughout the region, but the bulk of energy needs is still, at present, met by fossil fuels.

As the war in Ukraine compounds with other crises, its impacts are revealing major weaknesses in both global food and energy systems. The conflict and resulting US and EU sanctions have disrupted the trade of many commodities in the Mediterranean region, including food and oil and gas commodities with increasing inflation to levels not seen in decades. Soaring prices are contributing to a global cost-of-living crisis with impacts falling disproportionately on developing countries. Communities across the Mediterranean region, especially in North-Africa and the East Mediterranean have been hit hard, with already vulnerable households paying the highest price. The vulnerability of global food supply and energy systems is due in large part to its reliance on fossil fuels, thus susceptible to hydrocarbons' market volatility and price shocks.

Concomitantly, as the Cop 27 unfolds in Egypt, the global challenge of climate change remains yet unresolved, with increasing carbon dioxide (CO_2) emissions mostly related to fossil-fuel consumption, triggering more frequent and extreme weather events, especially in climate hotspots such as the Mediterranean region. A complete transition to a net-zero carbon future can be the proper solution addressing both energy security and climate issues. Reducing the regional consumption of carbon-emitting fuels and accelerating the decarbonisation of its economies by investing in innovative, green and circular solutions would strengthen the Mediterranean's energy security and strategic autonomy. It would also help achieve climate goals and provide the basis for a sustainable economic growth.

In this context, MEP 2022 *"Special COP 27 Edition"* considers two scenarios which explore 2 very different pathways for the Mediterranean energy system and its 26 member countries to 2050, taking into account the impact of the recent pandemic and energy crisis in its prognoses. For this outlook, OME has updated its Reference Scenario and aa alternative neutral carbon scenario a joint scenario, developed with the UfM platforms for the European Commission, the ProMED "Net Zero Carbon" Scenario.

- The **Reference Scenario** (RS) is a Baseline Scenario (current trends), which takes into account past trends, current policies and ongoing projects. It incorporates the Nationally Determined Contributions (NDCs), but it assumes that international financing and other aids will not be forthcoming. Under this scenario, the increased demand for electricity will be met with the traditional primary energy sources and with others that will be available in the future.

- The **ProMED** "Near Zero Carbon" Scenario (PM) – a joint scenario co-funded by the European Commission – foresees more ambitious measures for energy efficiency, significant technology development to further curb CO_2 emissions, as well as increased diversification in the energy mix tailored for each country and. It assumes a substantial increase in renewables, especially in power generation, but also in end-usage with the increase of storage and the introduction of hydrogen. It also assumes a sizeable shift in the transport and industry sectors and increase in building efficiency.

The Mediterranean energy system must undergo a fundamental restructuring and reshaping in order to provide the necessary level of decarbonization, which would create challenges but would also provide various opportunities.

1 ENERGY DEMAND CAPPED THROUGH ENERGY EFFICIENCY

With the intense focus on energy security, affordability and climate goals, programmes to reduce consumers' energy demand, through behaviour changes, will be an essential tool for policy makers. Such initiatives represent some of the cheapest and fastest achievable energy savings available to governments. To achieve a net-zero carbon future by 2050, total Mediterranean energy demand will need to be reduced by a quarter from current levels – a challenging feat when considering the +135 Million increase in population in the South, coupled with a doubling of GDP prospects over the same horizon. Over the past 3 decades, energy demand increased by 44% and, under current trends, would increase by 31% (even including unconditional NDCs Targets) to 2050.

The situation is quite contrasted across the two shores of the Mediterranean, with an already declining energy demand in the North, where energy efficiency measures are already being enforced coupled with falling population trends, while in the South energy demand has been soaring and population and economic growth thriving. To reach carbon neutrality by 2050, in the North Mediterranean, energy demand will need to be reduced by a further 41%, while increase in demand in the South should be capped at under 2% to 2050 from current levels.

It is not just the level of demand that needs to be brought down but also the fuel mix that needs to improve drastically. At present, fossil fuels account for 76% of the energy mix (65% in the North and 92% in the South). Renewables, although fast increasing, stand at only 12% of the total Mediterranean energy demand and while that share reaches 15% in the North, it is barely attaining 8% of total energy demand in the South. In 2030, even if all NDCs are reached, fossil fuels will still account for 71% of the mix (80% in the South alone) due to the inertia of transport and industry demand that cannot be hastily displaced. In a net-zero carbon future, renewables will need to step-up to reach 57% of the total mix by 2050 around 60% in the North and 55% in the South.

To reach the net-zero target, by 2050 the energy mix will need to be 57% renewables, 17% nuclear and 26% fossil (23% for gas alone – the least carbon intensive fossil fuel).

2 MASSIVE ELECTRIFICATION OF END-USAGES

The change in the mix and the decrease in energy demand overall will be driven substantially by the electrification of most end-uses with electricity accounting for 56% of total final consumption by 2050 compared to 22% currently. The main hurdles and the biggest challenges will be the displacement of heavy fossil-fuel use in both transport and industry sectors to electricity and biofuels. While many countries have already called for a ban of the sale of fossil-fuelled light vehicles by mid 30s, the bulk of the substitution is not expected until well in the 40s. Green fuels, such as notably biofuels and hydrogen, are expected to pitch-in where electricity offers no substitute (notably freight transport and heavy industries).

In 2050, to reach the et-zero target, fossil-fuel share in Mediterranean total final consumption should plummet to less than 22% down from 70% currently. Total energy consumption in transport alone will need to be reduced by 31% and oil would only account for 8% of transport in 2050.

3 A GREEN FUTURE: RENEWABLES, PILLAR OF THE ENERGY TRANSITION

Renewable energy is set to play a pivotal role over the outlook period. From more than doubling in the Reference Scenario to more than tripling in a net-zero carbon outlook, renewables would account for for more than half of total Mediterranean energy demand in a carbon neutral outlook. Most of the increase in renewables in the region will stem from solar and wind technologies

To keep-up with the electrification of its end-usages, Mediterranean countries will need to increase substantially their power generation even in the North. Overall Mediterranean power generation will need to increase by 11% to 2030 and by 30% to 2050. In the South Mediterranean, power generation will need to double by 2040 and nearly triple by 2050.

The future of power generation is decidedly green. Presently, renewables accounts for 28% of total power generation, while in 2050 they are expected to reach the lion share of generation with a contribution of 78% in total generation. Both North and South Mediterranean countries will need to deploy their potentials extensively. There will be 12% of generation from nuclear with the development of nuclear plants in several south Mediterranean countries (Egypt, Turkey, Jordan and Morocco) with France steadying its reliance on nuclear generation with the replacement of old reactors by new and more efficient ones. Gas will still have a role, accounting for a 9% of total generation in 2050 compared to 33% today.

Electricity storage will be paramount to the successful integration of renewables and the responsiveness of the electricity system to ensure the stability of network operation. By 2030, electricity storage will account for 1% of the generation and will reach 10% by 2050.

This increase in generation will be mirrored by the power capacity that will need to be added to existing infrastructures. Most capacity additions will stem from renewables and nearly all from solar and wind technologies. The bulk of renewable capacity additions is expected in the South Mediterranean countries. In parallel, fossil-fuelled power plants will need to be progressively shut down.

Current solar capacity stands at 85 GW in the total Mediterranean region. A 600 GW net additional capacity will need to be installed by 2050 of which about half – 350 GW - in the South region. Wind technologies will also encounter striking capacity additions with at total net increase of nearly 500 GW of which 300 GW in the South Mediterranean countries – both onshore and offshore technologies will be deployed in the region.

4 ENERGY SECURITY AND THE FUTURE STABILITY OF THE REGION AT STAKE

Today, the Mediterranean stands at the crossroad of multiple crises. The energy crisis is exposing the dangers of high energy dependence levels of the region on fossil fuels. North Mediterranean countries have always been heavily reliant on imported fossil fuels and these levels reached over 60% in past years (in 2019, net imported volumes reached 15 000 PJ). The ongoing crisis is not just a European

crisis as also heavily fossil-fuel dependent South Mediterranean countries are being impacted. Furthermore, the economies of such countries had already suffered greatly form the Arab spring upheavals and the pandemic. Some countries, such as Morocco, Jordan and Lebanon, have energy dependence scores of over 90%. Under current trends, Mediterranean energy imports would only increase to reach over 20 000 PJ in 2050 – a 25% increase from current levels. This would be economically and geopolitically unsustainable.

Additional exploration activity and new gas discoveries in South and East Mediterranean, since last year, are increasing the hopes that gas exports from the region will continue to rise in the near future. Equally important is the push for renewable gases such as biomethane, biofuels and hydrogen which will help reduce the dependency on fossil fuels in the north. By 2050, green gas production will account for 23% of Mediterranean gas demand in a neutral carbon outlook.

Moving towards a net-zero carbon future would thus alleviate greatly fossil-fuel dependence in the Mediterranean region, particularly in the North. By 2030, net fossil fuel imports would be more than halved and the whole region would become a net fossil-fuel exporter by 2040. This is largely due to increasing exports in the South Mediterranean which would make the region a net exporter after 2030.

Currently, the war on Ukraine and geopolitical risks in the region seem to escalate, and while this is creating havoc, it could also be an opportunity for countries around the Mediterranean to regroup in a cooperative way and play a constructive role in mitigating the energy supply disruption and in containing instability. The development of gas fields, new solar and wind projects and the execution of energy infrastructure projects through synergies with regional partners and within the framework of a Mediterranean energy strategy would provide a win-win situation by which cooperation benefits all.

5 CO_2 EMISSIONS AND CLIMATE CHANGE

Net zero carbon emissions refers to the balance between the amount of greenhouse gas produced and the amount removed from the atmosphere. Net-zero emissions are achieved when all GHG emissions released by human activities are counterbalanced by removing GHGs from the atmosphere in a process known as carbon removal – absorbed by carbon sinks - which include forests, grasslands, and later, carbon capture utilisation and storage (CCUS) technologies.

While contributing only 6% to the global carbon emissions, The Mediterranean basin is a climate hotspot currently warming 20% faster than the rest of the globe. Climate change impacts are already visible across most of the Mediterranean basin and under current trends the situation would worsen and become unsustainable.

To avoid the worst climate impacts, global greenhouse gas (GHG) emissions will need to reach net-zero around mid-century. The COP27 hosted in Egypt has emphasised the long-term goals to maintain a 1.5 °C pathway in line with the Paris Agreement despite the new geopolitical context, stressing the need for energy security. Global efforts on climate change have shifted from mitigation to adaptation. For the Mediterranean region this means reducing carbon emissions of nearly tenfold from 2000 Mt currently to 236 Mt by 2050.

The Mediterranean region has been a pioneer in the establishment of a framework for the promotion of sustainable development. All Mediterranean countries are engaged in international commitments

to mitigate climate change and are signatories to the Kyoto Protocol and have all ratified the Paris Agreement (except Libya).

Energy efficiency measures and renewables will account for the bulk of the energy related carbon emissions reduction, with energy efficiency expected to account for a 46% of carbon emission reduction and renewables for 44%. However, to reach full decarbonisation, green gases (such as hydrogen, biofuels and biomethane) will be pivotal, as well as carbon capture technologies (CCUS) especially for the industry sector.

6 SIZEABLE ENERGY INVESTMENTS NEEDED

Scaling-up the energy transition in the Mediterranean in line with a net-zero emissions target will be costly. The Mediterranean region would need around 2 000 billion euros of investment between 2022 and 2030 to meet their NDC targets. To reach carbon neutrality in 2050 the required investment would exceed 6 700 billion euros – a near 7 trillion ticket to achieve climate goals and energy security in the region. Half of the investments will be needed the South Mediterranean alone. Three quarters of these investments will need to be deployed in the 2030-2050 decades.

Half of the total investments should target energy saving rather than energy production, to fuel a proper development of energy efficiency measures. The power sector will account for nearly 40% of total investment needs.

Looking at direct energy investments (excluding energy efficiency investments), renewables will account for 70% of total investment needs, while nuclear for a 11%. Thus, a total of 81% of investments will go to non-hydrocarbon energy supply. The remaining 19% on fossil fuels will be mainly for natural gas – upstream/midstream and refurbishment of gas plants and infrastructures with more efficient utilities, as gas is the cleanest fuel among hydrocarbons.

Although the 240 billion euros a year needed to fuel the transition may seem daunting, it is not just the cost of energy and efficiency that needs to be considered to get the real picture. The cost of inaction would make a real mark on the Mediterranean's economy and population. Climate shocks could shrink economies, increase energy bills, reduce export revenues, increase poverty, and decrease real wages, not to mention the severe impacts on agriculture/food/water. If the rest of the world decarbonizes and the Mediterranean does not, the cost of inaction would even worsen.

International private fundings are essential to meet this large investment need. However, various barriers in South countries – especially in terms of policies – continue to prevent international investors from becoming more engaged in the South's renewable energy sectors. Against this backdrop, further support is required so that the South Mediterranean countries can meet their energy demands in a sustainable way to the benefit of the whole region.

Supporting a sustainable energy development would indeed imply opening-up new business opportunities for Euro-Mediterranean energy companies which would benefit from both operating in a rapidly growing market and promoting the export of European renewable energy technologies. This is already notably the case for wind power, a sector in which the South currently relies on imported European technology.

This would allow to promote a more rapid economic development in the South, which is a key prerequisite for expanding the region's economic and trade relations between the two shores, with the positive geopolitical repercussions this would entail. Moreover, this would guarantee the stability of future gas exports from the South to Europe, by allowing these countries to meet their growing electricity demand with renewables instead of gas. Freeing gas for exports will enhance EU's gas security-of-supply, thus increasing the stability and security of the whole region.

7 A MORE-THAN-EVER NEED FOR REGIONAL COOPERATION

Under current auspices, with uncertainties and shortages fracturing long-standing trading relationships, the Mediterranean region risks seeing a reversal of decarbonization—on which progress is already moving too slowly. Intertwined energy issues across the Mediterranean are plentiful; more cooperation is urgently needed to foster and achieve these synergies. Reducing consumption of fossil fuels and accelerating the decarbonisation of economies by investing in innovative, green, and digital technologies (such as biofuels, hydrogen, electricity storage, carbon capture technologies, smart grids, circular economy solutions etc.) will strengthen the Mediterranean's energy security and strategic autonomy. It will also help achieve climate goals and provide the basis for sustainable economic growth. The European Green Deal is a considerable move in the right direction, but there is an urgent need to encompass the Mediterranean region as a whole and to invest more and faster, to foster the much-needed diversification of supply, to effectively reduce climate change consequences and build a stronger, more autonomous, and more competitive economy for the region. The conflict in Ukraine makes this need only greater and more urgent.

Interconnectivity can be a significant vessel. No country can achieve a successful transition without producing, storing, and exporting green energy, without being a part of a new infrastructure, know-how, technology, and governance model. A robust political response is necessary to address climate change and to ensure energy independence.

The war on Ukraine has also revived interest in the development of natural gas resources and the execution of infrastructures that can bring energy to consumers across the Mediterranean. The South and East Mediterranean can play an increased role in European energy security as several resources in the region are unlocked.

Given geographical proximity and century-long historical ties, a close cooperation between governments and private companies on the two sides of the Mediterranean to explore and develop all forms of energy will be mutually beneficial in these difficult times. Developing and utilizing all energy resources (fossil-fuels and renewables) would benefit all parties. It is a win-win situation. Creating a more integrated Mediterranean energy market is of primary importance to address the fast-growing energy demand in the Southern Mediterranean countries, while favouring low-carbon and renewable energy sources and energy efficiency solutions. This means supporting democratic reforms, pursuing market liberalization, and providing adequate funding and technical assistance.

As the Mediterranean becomes more turbulent, Mediterranean countries should adopt a specific regional strategy that brings together geo-economic and energy to maintain independence and stability. The Mediterranean is at a crossroad and must choose between becoming entangled in conflicts or devising a cohesive strategy that can enable it to play a defining role in its future. For a region with lots of regional conflicts as well as with a huge untapped potential, the concept of a Mediterranean Green Deal emerges as a new historic cooperation opportunity.

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As the consequences of recent conflicts reverberate globally on energy and food security with immediate repercussion on the Mediterranean region, energy security and climate change are even more interweaved, pushing energy at the forefront of governments and the industry's agendas – highlighting the necessity of a concerted and effective response.

In this special COP 27 edition of its *Mediterranean Energy Perspectives*, OME has developed a net-zero carbon scenario, to address these critical issues, where all Mediterranean countries reach the net-zero carbon emissions target by 2050. This ProMED Scenario, co-funded by the European Commission, looks at how to reach this target and its implications, not only from an energy's perspective demand, but also from the investments required to fuel it.

Find out how the choices made today will affect energy supply and demand by fuel and by sector, the scale of required investments, and how the Region can move away from unsustainable current trends to achieve carbon neutrality, while enhancing energy security.

This carbon neutral scenario for the Mediterranean region provides an in-depth and comprehensive analysis of the most important factors, challenges, and uncertainties which are likely to affect the Mediterranean energy trends over the next 30 years.

Co-funded by the European Union

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