Mediterranean Energy Perspectives 2023

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EXECUTIVE SUMMARY

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Organisation Méditerranéenne de l'Energie et du Climat

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Global and regional geopolitics, including the 2022 Ukraine war and current conflicts in the region continue to have deep human, social as well as economic impact across countries and sectors. The ripple effects and uncertainties on the energy sector are still ongoing and energy-related greenhouse gas emissions have continued to rise in the region, reaching a new record in 2022. However, the past years have also seen remarkable progress in developing and deploying some key clean energy technologies and decoupling energy demand from socio-economic trends. Higher prices have also led to increased energy poverty around the world, including both developed and developing economies.

The global energy crisis prompted a range of new initiatives in the Mediterranean region that aim to increase the pace of clean energy deployment. Measures vary from country to country, but they all tend to place greater emphasis on boosting the share of renewables in electricity generation, improving energy efficiency, and bolstering electrification of end-usages.

In this context, the first *Mediterranean Energy Perspectives Special COP 28 Edition (MEP 2023)*, under the new name of OME as the Organisation Méditerranéenne de l'Energie et du Climat (OMEC) considers two scenarios which explore 2 different pathways for the Mediterranean energy system and its 26 member countries to 2050. For this outlook, OMEC has updated its Reference Scenario and an alternative neutral carbon scenario co-funded by 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 enough to reach the NDCs in full. 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 "Net-Zero Carbon" Scenario (PM) reaches the net-zero carbon emission target by 2050 through 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 based on their national pledges.

MEP 2023 lays out the foundations for a well-designed energy system that serves as a catalyst for social and economic development at local and regional levels, measuring the energy efficiency deployment and detailing the transition path away from fossil fuels to cleaner energy sources and technologies at horizon 2050. MEP 2023 also assesses the corresponding investments required for the electrification of end-use sectors and restructuring energy supply away from carbon-intensive forms of energy.

Renewables and efficiency are key to reach the net-zero target by 2050

Renewables are the fastest growing energy source in most Mediterranean countries. Yet, despite this upward trend, renewables need to step-up at a faster pace as the fuel mix needs to improve drastically to reach a net-zero future by mid-century. At present, fossil fuels account for 75% of the energy mix (64% in the North and 91% in the South). Renewables, although fast increasing, stand at only 13% of the total Mediterranean energy demand and while that share reaches 16% in the North, it is barely attaining 9% of total energy demand in the South.

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 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

In 2030, even if all unconditional NDCs are reached, fossil fuels will still account for 70% of the mix (85% 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 a quarter of the total mix by 2030 around 31% in the North and 15% in the South.

To reach the net-zero target, by 2050 the energy mix will need to be 59% renewables (65% in the North and 54% in the South), 15% nuclear and 26% fossil (23% for gas alone – the least carbon intensive fossil fuel).

To achieve a net-zero carbon future by 2050, not only the energy mix needs to transition away from fossil fuels, but total Mediterranean energy demand will also need to be reduced by a 20% from current levels – a challenging feat when considering the +123 million increase in population in the South, coupled with a near tripling of GDP prospects over the same horizon. Over the past 3 decades, energy demand increased by 43% and, under current trends, would increase by 30% 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 39%, while increase in demand in the South should be capped at under 6% to 2050 from current levels.

Electrification of the energy system at the core of the transition

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 59% 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 (notably the EU ban on combustion engines by 2035), the bulk of the substitution is not expected until well in the 40s. Green fuels, such as biofuels (including hydrogen), are expected to pitch-in where electricity offers no substitute (especially for freight transport and heavy industries).

In 2050, to reach the net-zero target, fossil-fuel share in Mediterranean total final consumption should fall to less than 22% down from 69% currently. Total energy consumption in transport alone will need to be reduced by 30% and oil would only account for 9% of transport in 2050.

To keep-up with the electrification of its end-usages, Mediterranean countries will need to increase substantially their power generation on both shores of the Mediterranean. Overall Mediterranean power generation will need to increase by 22% to 2030 and to more than double by 2050 (+123%). In the South Mediterranean, power generation will need to double by 2040 and more than triple by 2050.

The future of power generation is decidedly green. Presently, renewables account for 30% of total power generation, while in

2050 they are expected to reach the lion share of generation with a contribution of 79% in total generation in the ProMED Scenario. Both North and South Mediterranean countries will need to deploy their potentials extensively.

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 (almost all solar PV) stands at 78 GW in the total Mediterranean region. A 590 GW net additional capacity will need to be installed by 2050 of which over two thirds – 420 GW - in the South region. Wind technologies will also encounter striking capacity additions with at total net increase of nearly 560 GW of which 320 GW in the South Mediterranean countries – an additional 155 GW of offshore technologies alone will be deployed in the region.

A need for system flexibility

The huge increased need for electricity system flexibility requires massive growth of battery energy storage and expanded transmission and distribution grids, as well as more dispatchable low-emissions capacity, including nuclear, hydrogen and fossil fuel capacity with carbon capture and storage.

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% to 2% of the generation. To achieve a net-zero transition, battery energy storage will need to reach 10% by 2050.

For all Mediterranean countries extending and modernising electricity grids, addressing supply chain bottlenecks, and securely integrating variable renewables are critical.

Nuclear will play a role in the transition at about 10% of the energy mix by 2050 with the development of nuclear plants in several south Mediterranean countries that would counterbalance France steadying its reliance on nuclear generation (with the replacement of old reactors by new and more efficient ones) and the phasing out in Spain.

Hydrogen, especially green hydrogen will need to be deployed at large scale and would account for 6% of energy demand by 2050 - essentially in the industry and transport sectors where demand cannot easily be displaced by electricity.

While the world is advocating to transition away from fossil fuels, hydrocarbons will still be part of the energy mix in the Mediterranean, even in the Net-zero carbon future. Gas is set to be the transition fuel accounting for a 9% of total generation in 2050 compared to 36% currently.

A more secure and safer future is possible

The Mediterranean region's economies are weathering the challenging global environment with high inflation and tighter financing conditions, while high energy prices weigh heavily on household and government finances.

The energy crisis has exposed 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 2021, net imported volumes reached 15 000 PJ). Heavily fossil-fuel dependent South Mediterranean countries are also being impacted (with some countries, such as Morocco, Jordan and

Lebanon, having energy dependence scores of over 90%). Under current trends, Mediterranean energy imports would only increase to reach 18 000 PJ in 2050 – a 12% increase from current levels (a ninefold increase of net fossil fuel import volumes in the South). This would be economically and geopolitically unsustainable.

Additional exploration activity and new gas discoveries in South and East Mediterranean, in the past couple of years, 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.

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 decrease by 40% and the whole region would become a net fossil-fuel exporter by 2040.

Currently, the geopolitical risks in the region seem to escalate, and while this is creating havoc, it is also fostering 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.

Energy transition also brings new risks to energy security. One set of risks relate to supply chains for clean energy technologies and for critical minerals. Supply chains for both are highly geographically concentrated. Diversified moves by countries to reduce dependence on imported fuels and on geographically

concentrated clean energy technology supply chains to meet growing demand can help, but the need for regional trade and co-operation remains strong in the region. No country can expect to be wholly self-sufficient, and most will continue to depend on imports and exports. Regional collaboration on infrastructure and innovation in particular will remain vital in the development of clean energy technologies.

A cleaner future within reach

August 2023 ranked as the warmest August in the 174-year global climate record, and the highest on record for any month. The impacts of climate change are increasingly frequent and severe in the Mediterranean region, and scientific warnings about the dangers of the current pathway have become stronger than ever.

The scaling up of clean energy is required to bend the emissions curve sharply downwards by 2050 in the ProMED Scenario.

In a net-zero future, strong growth in clean energy and other policy measures together lead to energy sector CO_2 emissions falling by 86% by 2050 compared to 2021. Ramping up renewables, improving energy efficiency, and increasing electrification with technologies available today deliver more than 89% of the emissions reductions needed by 2050. The North Mediterranean would reduce its emissions by 930 Mt and the South by 820 Mt from 2021 levels. However, if only the North Mediterranean countries were to decarbonize and the South Mediterranean continued with current trends, 80% of CO_2 avoided by North Mediterranean countries in the Net-Zero Scenario would be cancelled by the increase of emissions in the South Mediterranean. Regional integration, building upon the complementarity between countries and a common vision of a sustainable energy future in the region is paramount to a successful transition.

Embarking on the Net-Zero Scenario would be in line with the *Global Renewable and Efficiency Pledge* promoted by the European Commission with a tripling of renewable in generation by 2030 (fivefold increase to 2050) and doubling the rate of energy efficiency improvements by 2030 in the Mediterranean region as a whole.

The transition is not as costly as it may appear

Prospects for a secure, safe and fair energy transition in the Mediterranean region depends on securing high levels of investment. Energy investment levels show encouraging trends for renewables and electric vehicles, but there are large energy investment gaps in South Mediterranean economies and investment in most end-use areas is lagging in all regions with some South Mediterranean economies facing difficulties to obtain financing.

At first glance, cumulated energy investments requirements to fuel the energy transition to a net zero target by 2050 would require 80% more investments than under current trends. The Total cumulated investments would amount to 7 trillion euros over the 2023-2050 outlook. However, that figure does not take into account the cost of inaction that would need to be factored-in and added to the 4 trillion euros needed in the Reference Scenario; neither does it reflect the added economic and social benefits gained through the expansion of clean energy industries generating employment growth over the period in sectors such as solar PV, wind, electric vehicles and batteries, heat pumps, and critical minerals.

Energy needs in South Mediterranean economies are increasing rapidly. The total investment requirements in the South Mediterranean to achieve the transition by 2050 would amount to just over 3 trillion euros – about 46% of total Mediterranean investment needs. The South Mediterranean energy transition

requires major new investment in energy infrastructure (1 trillion euros for electricity) ranging from electricity generation (680 bn euros) and grids and storage (320 bn euros) as well as sizeable investments in energy efficiency (1.5 trillion euros). For this investment to take place, private capital will be needed to close the gap. Enabling frameworks for attracting investors and developers are, in this context, of high priority.

Despite declining energy demand trends, the need for refurbishment in North Mediterranean countries is high and costly, requiring substantial investments that are falling behind scheduled targets. Overall, the energy investments for the North Mediterranean would reach 3.7 trillion euros of which 2 trillion (55%) for energy efficiency alone.

Clean energy technologies deployment in the Mediterranean will require 2 trillion euros to meet the net-zero target but they offer cost-effective solutions for a range of development objectives and foster domestic economic growth. The transition to a clean energy system affects every aspect of society. The transition towards net-zero emissions will lead to an overall increase in energy sector jobs for the region and decrease the overall energy dependence on fossil fuels while limiting the negative impacts of climate change on the economy. Taking these broader implications in the calculations would lead the energy transition to be, in fact, less costly than the current path.

Mediterranean Energy Perspectives 2023

Mediterranean Energy Perspectives 2023 (MEP 2023) presents the outlook for Mediterranean energy markets through 2050.

This publication was prepared by the Organisation Méditerranéenne de l'Energie et du Climat (OMEC), an association of industry members from 16 countries around the Mediterranean basin. OMEC delivers expert analysis, data, policy advice and solutions to bolster efforts to tackle climate change in the region and accelerate decarbonisation.

In this MEP edition, released at COP 28, OMEC presents the results of the recently updated Net-Zero and Reference Scenarios to 2050, including details of what is needed from governments, companies, investors and Mediterranean citizens to decarbonise the energy system and put emissions on a path compatible with a temperature rise below 1.5 degrees Celsius above pre-industrial levels.

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