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HYDROCARBON EXTRACTION vs OFFSHORE WIND:
Can Greece become a green energy hub in the Mediterranean?

POLICY PAPER

HELLENIC REPUBLIC
National and Kapodistrian University of Athens
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United Nations Educational, Scientific and Cultural Organization

UNESCO Chair on Climate Diplomacy, National and Kapodistrian University of Athens, Greece

The Green Tank Policy solutions for a sustainable future

Hydrocarbon extraction vs Offshore wind:
Can Greece become a green energy hub in the Mediterranean?

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"Climate activists are sometimes depicted as dangerous radicals. But the truly dangerous radicals are the countries that are increasing the production of fossil fuels. Investing in new fossil fuels infrastructure is moral and economic madness."

António Guterres, UN Secretary General
April 2022

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Synopsis

- Both science and the new international and European institutional framework do not enable the entry into a new cycle of exploration, production, and consumption of fossil fuels.
- Domestic hydrocarbon extraction will delay the phase-out of fossil fuels, while it is far from certain that it will contribute to tackling the current energy crisis since it requires multi-year and high-cost investments to deliver results, leaving the question of such investments' recoup open.
- Even if hydrocarbon exploration in the Greek seas had made some progress, the relevant investments could not be materialised in the time frame set for the transition to climate neutrality.
- The current energy crisis has not increased the interest in new investments in hydrocarbon extraction. On the contrary, there is a shift from states and big companies to green investments, changing their policy at a faster pace than originally planned.
- Investments in renewable energy sources (RES) have a positive impact on states' economy in view of key macroeconomic (reduction of import tariffs with positive balance of payments) and microeconomic parameters (consumer benefits from the energy cost containment).
- Being an inexhaustible resource, wind energy -apart from its economic benefits- mitigates competition between states for the exclusive control over key energy resources, contrary to hydrocarbon extraction which undoubtedly has contributed to destabilisation in the wider area of the Eastern Mediterranean.
- Global energy geopolitics will change radically and sooner than expected. As a result, this fact will affect the current geopolitical balances. States' power will be decoupled from access to fossil fuels, while states that have invested in RES will be geopolitically upgraded due to the independence of their economy from fossil fuel imports. Pipeline diplomacy, at least in the Eastern Mediterranean, seems to be giving its way to the diplomacy of the 'cables' with the establishment of interconnected power generation communities through RES.
- The rapid transition to RES and the replacement of the hydrocarbon extraction programme by the development of offshore wind farms can impede geopolitical tensions. In particular, the above will make Greece energy self-sufficient, so that it is not affected by international crises such as the current one, even give it a new role as an energy provider, and will promote a model of cooperation and interconnectivity.
- The regime of the continental shelf (in Greece applies either in delimited marine areas or in the case of undelimited areas within the median line) provides the legal ground for the installation and operation of fixed-bottom offshore wind farms, thereby safeguarding Greece's legitimate interests as in the case of hydrocarbon extraction.
- The regime of the Exclusive Economic Zone (EEZ) (in Greece applies within its proclaimed EEZ in the partially delimited area south off Crete and Rhodes as agreed with Egypt and is expected to apply within the EEZ pending proclamation in the delimited area of the Ionian Sea as agreed with Italy) provides full protection of the interests of the coastal state and potential investors since it covers the

installation of both fixed-bottom and floating offshore wind farms.

- Hydrocarbon extraction is limited only to the exploitation of the continental shelf regime. However, the installation of both fixed-bottom and floating offshore wind farms can be the stimulus for Greece to extend the exercise of its jurisdiction over its adjacent waters by establishing an EEZ to further marine areas.

I. Introduction

The deterioration of the underlying energy crisis following Russia's illegal invasion of Ukraine on the 24th of February 2022, highlights the historic challenges that the European Union (EU-27) is facing in relation to its energy system. First and foremost, it urgently raises the question of securing its energy supply, but also of strengthening its energy autonomy so that it becomes independent from fossil fuel imports. This issue is inextricably linked to the recent targets that the EU has set towards 2030 and 2050 in order to deal with the intertemporal climate crisis and prevent the destructive impacts of global heating. The EU-27 has already launched the clean energy transition through a sustainable and fair roadmap, the European Green Deal, with the ultimate goal of achieving climate neutrality (i.e., net zero carbon dioxide (CO_2) emissions) by 2050. Remaining committed to this ambitious yet realistic goal, the European Commission has revised the relevant legislation through the Fit for 55 package, while due to the crisis caused by the war it has prepared a plan to accelerate the transition to green energy and become independent from unreliable suppliers and volatile fossil fuels (REPowerEU, 2022· see also The Green Tank, 2022). The said plan practically advances the implementation of the European Green Deal.

The above challenges are of particular importance for Greece. Back in 2019, the national government's decision to stop the extraction and exploitation of lignite, the most polluting of fossil fuels, was a brave and historic choice that greatly contributed to improving its climate change performance and placed the country high on the list of states that support decarbonisation. In addition, the National Climate Law passed on the 26th of May 2022 (Law 4936/2022), sets a national goal of reducing emissions by 55% in 2030 and 80% in 2040 compared to those concentrated in 1990, as well as carbon budgets for each polluting sector. The government has already started revising the National Energy and Climate Plan (NECP) in compliance with the new targets.

Given the current situation as well as the effects of climate change, the same government is called upon to take important decisions regarding the energy future of the country; that is, how to ensure the short-term energy supply and the long-term energy self-sufficiency of Greece in order to prevent the next energy crisis. As one of the first countries to warmly welcome the European Green Deal, Greece must develop a sustainable portfolio of energy resources that will keep it high on the list of states that support the independence from fossil fuels and are pioneers in the green energy transition in the wider area of Southeast Europe and the Mediterranean. Greece is an important recipient of climate deregulation since it is located in the Mediterranean region, which has been characterised as a climate change 'hotspot' (Chandler, 2021). It therefore has a strong interest in fighting for and demanding the implementation of international and European legal commitments as well as in rapidly moving away from fossil fuels being responsible for climate change.

Accelerating the implementation of the European Green Deal requires a full-scale alignment of the national development plan with its imperatives. In this context and in light of the new geopolitical setting, the question arises as to whether the -recently announced by the Prime Minister- exploitation of national hydrocarbon deposits with economic interest (provided of course they are detected) constitutes a viable prospect. Perhaps is it a bad decision, as was the cross-party choice in the 2010s to invest in the new lignite plant 'Ptolemaida 5', which will cost dearly while not being profitable in the long run? Will this perspective make the country an untrustworthy interlocutor on sustainability issues? How can we support the phase-out of (imported) fossil fuels on the one hand while investing in hydrocarbon extraction on the other? Taking the above into consideration, it should be noted that the transition process must be comprehensive whilst Greece should look for alternative green energy sources in order to achieve the greatest energy autonomy possible.

The objective of this policy paper is twofold: first, it aims to comprehend the challenges posed by the current situation and the deadlock in which the exploration and exploitation of hydrocarbons lead, and second, it investigates what is the best solution for the replacement of the extraction programme. In particular, the following sections analyse and explain why hydrocarbon exploration and exploitation plans must be promptly abandoned. Then, an attempt is made to examine the possibilities offered by the Greek seas for the installation of offshore wind farms and to highlight the opportunities and challenges that the political and institutional arrangements must overcome. Finally, the present analysis intends to draw conclusions that can contribute to the development of public debate and accelerate or launch new policy initiatives.

II. The deadlock of hydrocarbon extraction

The hydrocarbon extraction under the microscope

The acceleration of the independence from fossil gas in the EU-27 and the alignment with the objectives of the European Green Deal raises again and on a different basis the question of whether the planned explorations for hydrocarbon extraction in the Greek seas carry, especially at this particular juncture, an added value.

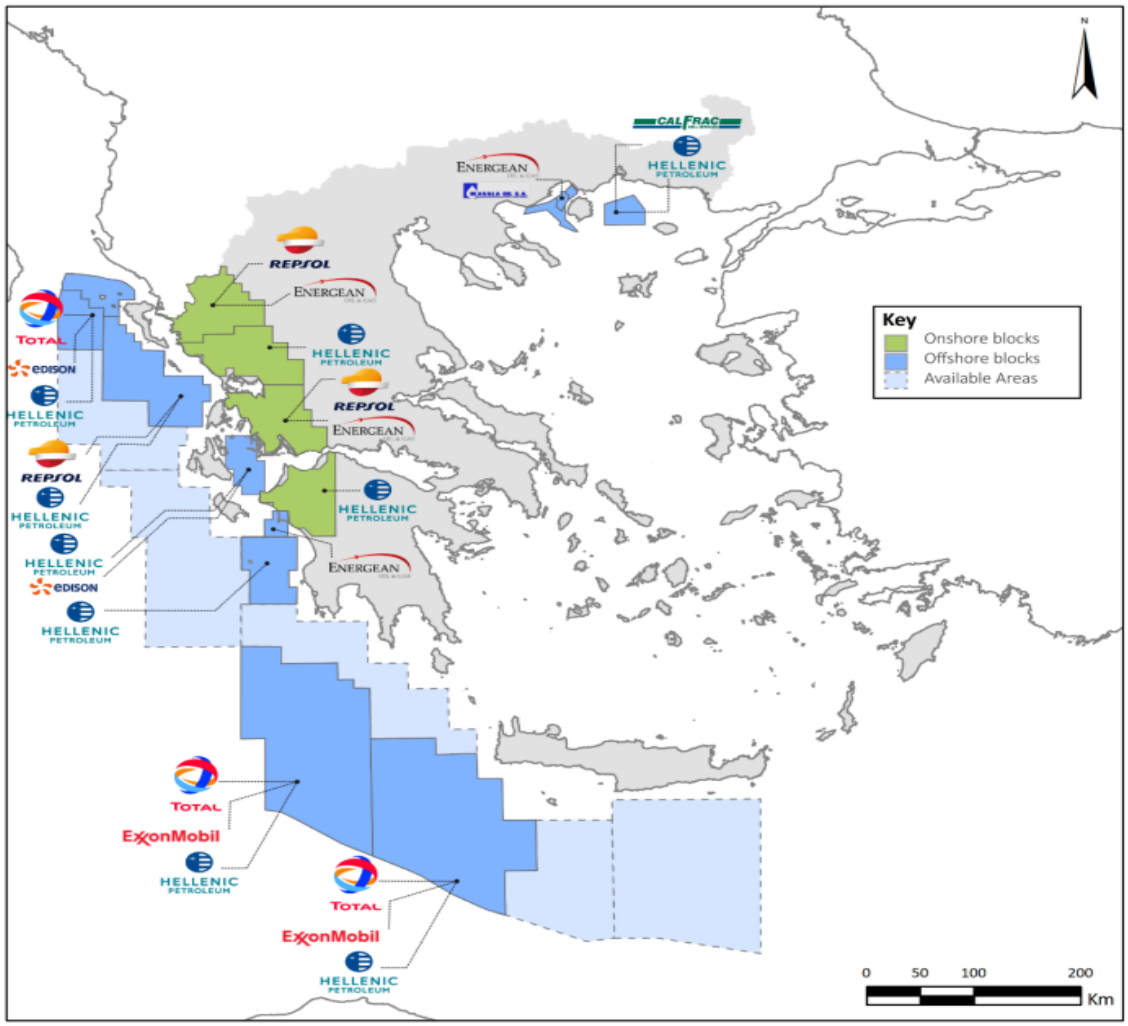
Despite its little experience in the exploration and exploitation of hydrocarbons, in 2010, under the influence of a painful economic crisis, Greece decided to experiment in the field. From the 1970s until today, only the Prinos deposit in the marine area of Thassos has been exploited, which covers approximately 1% of the country's needs (Basias, 2020). The discovery of oil in the marine area of Katakolon in Northwestern Peloponnese and gas in Epanomi in Northern Greece during the 1980s remained untapped at the time.

The discoveries of large gas fields in the Southeast Mediterranean (Israel, Egypt, and Cyprus) two decades later created the expectation that Greece could become a pole of attraction for hydrocarbon exploration and exploitation, upgrading its geopolitical importance and bargaining power (HEREMA, 2020). The implementation of surveys in conjunction with plans for the construction of the Eastern Mediterranean (EastMed) subsea pipeline, which would transport gas from the Southeast Mediterranean to Europe via Greece, would strengthen the country's geostrategic position. Therefore, a successful development of a hydrocarbon exploration scheme would enhance the country's energy security while providing time for a smooth transition to new forms of energy with a low carbon footprint (HEREMA, 2020). In this context, the discovery of deposits would contribute not only to the reduction of energy dependence, but also to the stimulation of the economy and employment, both during the crisis period and in the future.

In the light of the foregoing rather optimistic estimates, the interest in promoting hydrocarbon exploration and exploitation was revived. Thus, new legislative reforms in order to establish an attractive investment framework and international invitations addressing interested companies followed. From 2014 to 2019, Greece concluded eleven lease agreements with several companies under which the rights for exploration and exploitation of hydrocarbons are granted. Eight of the above agreements concern the following marine areas: "Katakolon", "Patraikos Gulf (west)", "Sea of Thrace (Prinos-South Kavala)", "Block 2, Ionian Sea (West of Corfu)", "Block 10, Ionian Sea (Kyparissiakos Gulf)", "Ionian Block", "West of Crete", and "Southwest of Crete". It is noted that one more concession of the marine area named "Block 1 - Northwest of Corfu" is currently under evaluation. The said marine areas extend mainly within the territorial sea of Greece, but also within its continental shelf and, more specifically, within the median line in the absence of delimitation agreements with neighbouring states (Art. 156 para. 1, Law 4001/2011).

In reality, however, there have been significant delays in the exploration process attributed either to bureaucratic reasons combined with the acceleration of the green transition at the EU level or to the fact that such investments in the Greek seas are generally considered risky in nature due to the geomorphology of the wider area (great depths) while the results regarding the actual potential of the blocks under concession have been extremely limited to date. All the above led to the withdrawal of big energy companies from concessions, such as Repsol's withdrawal from the Ionian block, or to the suspension of seismic surveys, such as the suspension by the Total-ExxonMobil-Hellenic Petroleum joint venture in the West of Crete and Southwest of Crete blocks (Alexandris/Finitikakis, 2022).

Hydrocarbon Concessions in Greece (December 2019)



Χερσαίες (πράσινο) και θαλάσσιες παραχωρήσεις (σκούρο μπλε) στην Ελλάδα. Περιοχές που μελέτησε πρόσφατα η ΕΔΕΥ για αξιολόγηση πρόσθετων δυνατοτήτων για την υπεράκτια έρευνα πετρελαίου και φυσικού αερίου (ανοικτό μπλε).

Source: HEREMA

Plans for hydrocarbon exploration and exploitation have mobilised environmental groups, which are reasonably concerned about the huge environmental footprint of such activities. In particular, both exploration and exploitation activities cause noise pollution affecting marine life, while the impacts from drilling as well as support and pipeline operations are also significant. According to WWF, "it is estimated that for each platform, the ecological balance of 20 acres of seabed and 3.2 acres per kilometre of pipeline is disturbed" (WWF, n.d.). Also, the cost assessment in terms of the ecosystem disruption caused by "the regular, operational pollution as well as small-scale pollution incidents" amounts to "up to 1.2 billion Euros over a 25-year horizon" (WWF, 2019).

Moreover, the probability of an accident would have devastating consequences not only for biodiversity, but also for the economic interests of coastal states. As international practice indicates, no technology or prevention measure ensures complete protection (Nature 2000 Committee, 2019), while in the event of a serious accident "the cumulative damages could reach 5.9 billion Euros (in present value) or 7.74 billion Euros (about 4% of the country's current GDP) in nominal terms" (WWF, 2019). Hydrocarbon extraction, especially at great depths such as those characterising the Greek seas, poses major challenges in terms of safety and measures dealing with an accident. The oil spill in the Gulf of Mexico back in 2010, where the depth of

extraction operations reached 1522m, was dealt with in 5 months (from the 20th of April to the 17th of September) (Pallardy, 2010), while the enormous ecological damage has not yet been fully evaluated or restored.

In addition to other actions, in 2019, three environmental organisations filed an application before the Hellenic Council of State for the cancellation of the ministerial decision which approved the Strategic Environmental Impact Assessment thereby giving the green light to the exploration activities in the West of Crete and Southwest of Crete blocks. The said application has been pending for three years and even if it is adjudicated within 2022, any decision of the Council of State is not expected before 2023 (Greenpeace, 2018· Floudopoulos, 2022).

Finally, the construction of the EastMed pipeline is currently uncertain given the questionable economic viability of the project. The relevant doubts were raised from the availability of gas in relation to the size of the pipeline, the lack of support from the US, and the limitations set by the objectives of the European Green Deal. Therefore, it becomes apparent that the initially optimistic scenarios have been reversed.

Hydrocarbons as a major driver of instability in the Eastern Mediterranean

It is a fact that the issue of offshore hydrocarbon exploration and exploitation fueled for many decades and continues to fuel geopolitical tensions in the wider Eastern Mediterranean region, as countries compete for control over key mineral resources. Although that does not constitute the only source of the current problems in the area, the existence of claims for the exploitation of hydrocarbons further complicates interstate relations.

The recent discovery of hydrocarbons in the Southeastern Mediterranean led to the refutation of the initial optimistic estimates for the emergence of the area as an energy supplier of the whole Europe and the strengthening of regional economic cooperation. The reality is closer to the concept of strategic competition and energy security is rather perceived as part of the realism theory in international relations (Vakulchuk et al., 2020). According to the latter theory, a logic of competition regarding the control of energy resources is more likely to prevail than a liberal type of cooperation, which dictates that states will end up cooperating to achieve a common goal, thereby strengthening the conditions for their peaceful coexistence (Collins, 2013). This confrontational interaction can lead to wider geopolitical competition, which is intensified by the geographical distribution of deposits in the region. In essence, this is a zero-sum game and a competition that resembles an arms race.

Indeed, the events of recent years seem to support the above view. Hydrocarbons have in many cases been the main cause of conflict between key players in the region rather than a tool for building trust and promoting cooperation. For instance, the initial optimism for the resolution of the Cyprus problem through cooperation and in the context of the wider hydrocarbon diplomacy (Grigoriadis, 2014), was quickly disproved. In particular, the discovery of deposits in the EEZ of the Republic of Cyprus during the early 2010s, turned out to be another bone of contention with Turkey.

The prospect of hydrocarbon extraction also played a catalytic role in Greek-Turkish relations. The escalation of tensions extended further west, i.e. towards Crete and the Dodecanese, while the controversial 2019 Memorandum of Understanding between Turkey and Libya on the delimitation of maritime jurisdiction areas in the Mediterranean caused more disruption. At the same time, in the summer of 2020, Turkey's decision to conduct surveys in an area of the Eastern Mediterranean, within which Greece exercises its legal and exclusive sovereign rights, led to one of the biggest crises of the last decades. The above events have accumulated new problems and security challenges in a region that has historically faced difficulties in interstate

cooperation and instability. Consequently, it is apparent that the competition for potential hydrocarbon extraction has repeatedly aggravated the geopolitical tensions, even reaching the brink of conflict.

Given the changing trends in Europe's energy reality, both due to its climate policy and the Russia's war against Ukraine, the role of Eastern Mediterranean hydrocarbon deposits, including the Greek ones (provided that they are eventually discovered), is disputable. The reservations about the feasibility of implementing the grandiose project of the EastMed pipeline, which would connect the aforementioned energy sources with Europe, and especially those ones concerning the pipeline capacity as well as the enormous financial costs for its construction, are constantly being strengthened. The withdrawal of the US support for the project in early February 2022 is rather indicative. In particular, according to the US, more emphasis should be placed on RES and electricity interconnection with Egypt (Kathimerini, 2022).

Drawing evidence from the existing literature, it should be noted that RES appear to produce substantial changes in the existing geopolitical correlations in the energy sector. Although several schools of thought interpret differently the potential of RES, i.e. to either mitigate geopolitical competition in the energy sector or lead to new forms of competition, there are already significant indications for the former. First, the geographical distribution of RES is more balanced. This equals to less incentive for geopolitical competition between states, as further developing RES worldwide can potentially mitigate the geographic imbalances found in the distribution of fossil fuel deposits. Moreover, energy produced from renewable sources is more difficult to be instrumentalised by specific actors, who could influence supply and prices, thereby causing a commensurate pressure on energy security, as described above. All in all, RES can shift the centre of gravity of energy security calculations and geopolitical correlations from external dependence to domestic energy production, thus mitigating competitive dynamics between states.

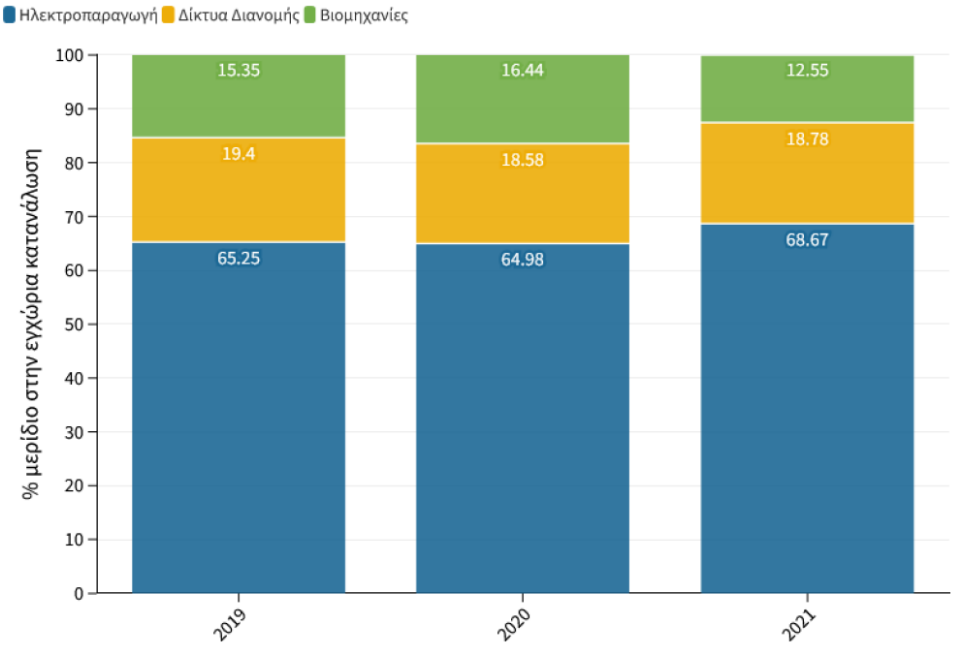
Disengagement from Russian dependence accelerates the green energy transition

The war in Ukraine has brought the issue of energy dependence on fossil fuels to the fore in a more demanding way than ever. Persisting in fossil gas as a transitional fuel in the attempt to decarbonise economies, which constituted an emergency solution, especially in the EU, at a time when its prices fluctuated at low levels and RES technologies were more expensive (Popov, 2021), seems to be no longer politically acceptable due to the high degree of dependence on imports from Russia. In particular, the discussion regarding the fossil fuel import dependency from states that use the pertinent revenues to strengthen their military power (e.g., Russia) or as foreign policy tools exerting political pressure (e.g., Venezuela), but also to maintain their influence in regions that supply the developed world with fossil energy resources (often by military means without the required legalisation by international institutions, as in the case of Iraq in 2003), takes on a new dimension.

The EU-27 imports 90% of the fossil gas it consumes, with Russia supplying around 41% (i.e., 152 billion cubic metres/bcm in 2020) either through pipelines (Nord Stream 1, Brotherhood, Yamal-Europe) or otherwise. Save fossil gas, the EU-27 also imports from Russia oil (25%) and coal (45%) (European Commission, March 2022). However, dependence on Russian fossil fuels is not identical for all Member States. As far as the fossil gas is concerned, certain Member States are almost exclusively dependent on Russian gas imports (i.e., Bulgaria, Hungary, Slovakia, and the Czech Republic) whereas for other Member States, such as Sweden, Denmark, Ireland, Croatia, and Austria, the dependence is of zero-degree.

Greece's dependence on Russian fossil gas has been close to the European average since 2020, mainly due to the exponential increase in the share of gas in electricity production, which in 2021 exceeded 68% of end uses, notwithstanding the noticeable diversification of gas supply sources and the rise of Liquefied Natural Gas (LNG) imports (The Green Tank, 2022).

Fossil gas allocation rates to end uses (2019-2021)



Source: DESFA – Presented by The Green Tank, 2022

In order to address the enormous challenges posed by the current situation in Europe's energy supply, the European Commission has proposed a plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition, as established under the European Green Deal. Notably, the aim of the REPowerEU Plan is to reduce the EU-27 dependency on Russian gas by two thirds (i.e., by 100 bcm) before the end of the year 2022. Sixty percent of the reduction will come from the supply of gas from other sources (i.e., increased LNG import and other non-Russian pipelines, as well as increased amount of green hydrogen production and import), while the rest will result from the acceleration of RES development in electricity generation by minimising the use of fossil fuels in households, buildings, and industry, installing heat pumps and producing biomethane and green hydrogen, as well as initiating additional measures to boost energy efficiency. These actions combined with the "Fit for 55" package and its climate targets are expected to reduce annual gas consumption by 30% by 2030. For the implementation of the plan, the European Commission will closely cooperate with the Member States to identify the most appropriate projects achieving the European objectives, on the basis of the existing recovery and resilience plans (RRPs).

Despite the surge in the fossil gas use in recent years (+11% in 2021 compared to 2020 and +10% in 2020 compared to 2019), Greece has a comparative advantage in relation to other European countries. Due to the high share of electricity generation in gas end uses, it is able to substitute imported gas in a quick and affordable manner by accelerating the development of technologically mature and properly spatially planned RES (The Green Tank, 2022). This is not the case for other EU countries that use much more gas amount in core sectors, such as industry and households. Therefore, following the lignite phase-out, Greece can become independent from this source of climatic and geopolitical instability as well as of high prices, more easily than many other Member States. To this end, the government shall depart from the plans for new

power plants fueled by fossil gas, but also from expensive projects on gas storage infrastructure or ambitious hydrocarbon transport projects such as the EastMed pipeline, the importance of which has clearly weakened in recent years. In a new European reality where the war in Ukraine is already accelerating the process of independence notably from gas, such infrastructures will become stranded assets much faster than anyone can imagine.

The new climate targets require rapid independence from all fossil fuels

These developments should be interpreted in light of the general political and institutional background dictating the green energy transition, but also of the strict warnings of science about the risks of insufficient preparation to prevent the climate crisis.

The most recent Intergovernmental Panel on Climate Change (IPCC) reports (August 2021 and April 2022) leave no doubt about the evolving climate crisis and the need to accelerate phasing out fossil fuels in order to keep global warming within tolerable limits. The above confirms what was already known and experienced in recent years, yet with greater certainty and more detail in terms of strengthening the necessary political action.

Three points should be highlighted:
(a) The criticality of the situation. The concentration of carbon dioxide in the atmosphere is currently at an all-time high. The Earth's global temperature has already risen by more than 1 degree Celsius, with the last five years being the warmest on record while this upward trend will further intensify in the coming decades. The increase in temperature expected for 2040 has arrived earlier and is causing more and more extreme weather events, heat waves, intense rainfall but also slow-onset events (e.g., sea level rise, droughts).

(b) Lack of time for climate action. Immediate action to reduce emissions during this decade in order to reach net zero by 2050 can prevent further deterioration. However, the national climate change action plans announced so far are insufficient to limit global warming to 1.5 degrees Celsius.

(c) Options to limit global warming. Investments in high-emissions infrastructure and reduced development of alternative energy sources until 2030 will hinder the acceleration of the climate action needed. Achieving the above target requires immediate fossil fuel phase-out and replacement with zero-carbon energy sources, i.e. RES. The latter -especially solar and wind energy- are the most mature of the existing technologies, as emphasised by the relevant IPCC report. In other words, keeping global warming within tolerable limits is still possible, but only by accelerating the green energy transition. In this context, it is needless to say that there is no space for new fossil fuel infrastructure.

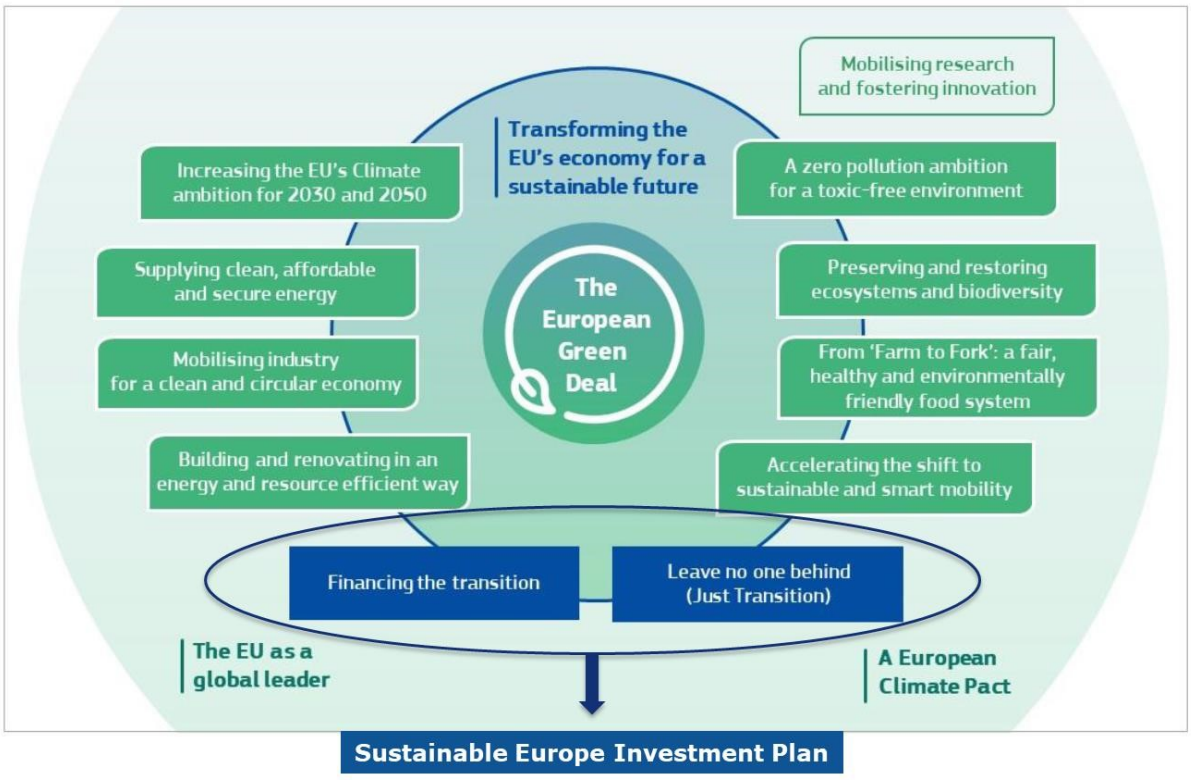
The most recent Global Climate Conference (COP26 – November 2021) incorporated some of these messages into its final decisions. The Glasgow Climate Pact indicates that keeping the Earth's average temperature to 1.5 degrees Celsius, rather than the 2 degrees Celsius proposed by the 2015 Paris Agreement on Climate Change, is now the norm. To achieve this goal, global emissions will need to be reduced by at least 45% by 2030. The text also emphasises the gradual decarbonisation of national economies and the removal of fossil fuel subsidies. Special mention should also be made of the global pledge signed by more than 100 countries to reduce emissions of methane, the second most important greenhouse gas after carbon dioxide, which constitutes a primary component of fossil gas. In particular, the target of reducing methane emissions by 30% by 2030 will bring about an additional temperature reduction of 0.04 degrees Celsius.

Over 100 countries, including the world's top polluters, have so far announced ambitious commitments to reduce greenhouse gas emissions in coming decades. The US plans to be

climate neutral by 2050. China has pledged to do so before 2060. The EU-27 has already launched the sustainable transformation of its economy to achieve climate neutrality in Europe by 2050. All these commitments send a clear message to investors, producers and consumers that the path to green energy is now a one-way street.

At the same time, the EU-27 is rapidly advancing the implementation of the European Green Deal. The 'European Climate Law' (Regulation (EU) 2021/1119) turned the political commitment to achieve climate neutrality by 2050 into a legal obligation, directly linked to international climate commitments. In addition, it set a new intermediate target of reducing emissions by at least 55% by 2030 compared to 1990 levels. In order to achieve these targets, the Commission took on a key role, as the 'European Climate Law' authorised it to determine and coordinate the path towards climate neutrality on the basis of cooperation with the Member States. Special mention should be made of the indication in the preamble of the text that all sectors of the economy, including energy, industry, transport, heating and cooling, buildings, agriculture, waste and land use, should contribute to the achievement of climate neutrality irrespective of whether those sectors are covered by the system for greenhouse gas emission allowance trading within the Union ('EU ETS').

The European Green Deal



Source: European Commission, 2020

In order to align European policies and legislation with the new intermediate climate target, the European Commission has introduced the 'Fit for 55' package.

The proposals of the said package include, *inter alia*,

1. *revision of the EU ETS*, in order to incorporate emissions from maritime transport, decrease the overall cap on emissions at an increased annual linear reduction factor, phase out the free allocation of emissions allowances in industry and aviation, and introduce a new,

separate emissions trading system to cover emissions from fuels used in road transport and buildings.

2. *increase of the emissions reduction target for sectors not covered by the EU ETS (non-ETS sectors)* from 29% to 40%, compared with 2005.
3. *increase of the target regarding the share of renewable energy sources in the overall energy mix* from the current 32% to at least 40% by 2030. It should be noted that in less than a year since the announcement of the European Commission's proposal, this target has already been revised as the REPowerEU plan sets a new target of 45% by 2030.
4. *increase of the target for energy efficiency* from 32.5% to 36% for final, and 39% for primary energy consumption.
5. revision of existing legislation aiming to accelerate the deployment of infrastructure for recharging or refuelling vehicles with alternative fuels and to provide alternative power supply for ships in ports and stationary aircraft.
6. *revision of rules on CO_2 emissions for cars and vans*, stipulating that from 2035 it will no longer be possible to place cars or vans with an internal combustion engine on the market in the EU.
7. *revision of the energy products and electricity taxation*.
8. sustainable aviation fuels (ReFuelEU Aviation) and greener fuels in shipping (FuelEU Maritime).

The EU's ambitious commitments, as well as its performance so far, confirm its leading role in international cooperation on climate change. In 2020, the EU recorded a 31% reduction in greenhouse gas emissions compared to 1990 levels, while the share of RES in total energy consumption increased by 21.3% (EEA, 2021, 7-8). However, in order to achieve the new targets set by the 'European Climate Law' for 2030, more action is required by Member States (EEA, 2021). Notably, the reduction of greenhouse gas emissions requires not only the cessation of energy production from coal, but also from other fossil energy sources, i.e. oil and gas.

Therefore, it becomes clear that both science and the new international and European institutional framework do not enable the entry into a new cycle of exploration, production and consumption of fossil fuels. It is indicative that since 2014 when the hydrocarbon exploration started in Greece, no particular progress has been made. In accordance with the Greek legislation, the duration of the exploration stage in concession blocks cannot exceed 8 years while the exploitation stage of each block lasts 25 years with the possibility of two five-year extensions (Art. 5, Law 2289/1995; Art. 158, Law 4001/2011). However, to date, in none of the concession blocks has the exploration process been completed and no commercially exploitable deposit, fit for production and transportation, has been identified. As a result, even if hydrocarbon extraction was to start tomorrow, the payback of such an investment would be rather difficult approaching 2050, i.e. the year by which Greece committed to have achieved the transition to a net zero economy. Taking all the above into account, it is apparent that serious questions arise with regard to the sustainability of a new investment in fossil fuels.

States and companies are moving away from hydrocarbon extraction

An equally important element to be taken into consideration is the trend observed in the field of hydrocarbon extraction by both States and companies.

In particular, four EU Member States have already adopted regulatory acts on the basis of which they completely prohibit any new hydrocarbon exploration and exploitation. Through the 2020 North Sea Agreement, Denmark cancelled current and all future licensing rounds while introducing cutoff date of 31 December 2050 for existing fossil extraction. It is also worth

mentioning that on the 18th May 2022 (the same day with the presentation of the EU's REPowerEU Action Plan), the President of the European Commission, the German Chancellor and the Prime Ministers of Denmark, Belgium and the Netherlands jointly signed the Esbjerg Declaration on the basis of which they pledged to collaborate more closely in order to raise offshore wind capacity of the four countries in the North Sea to 150GW by 2050. Ireland has followed the same route by amending its climate law. France, by Law 2017-1839, has ordered the end to all activities of hydrocarbon exploration and exploitation by 2040. All existing permits will expire by the 1st January 2040, unless the permit holders clearly demonstrate that the limited concession time does not allow to recover costs, thereby causing damage. The most interesting part of the said law lies in the fact that 5 years before the expiry of each concession, the permit holders are required to draw up a report indicating the possibility of converting the existing hydrocarbon extraction installations into, among others, RES installations. Spain adopted a similar ban by the 31st of December 2042 with the approval of its climate law. Italy also adopted legislation imposing a temporary moratorium on oil and gas exploration and exploitation activities until the conclusion of a plan promoting environmental, social and economic sustainability in the country's energy activities. At the same time, the said legislative framework expressly allowed the installation of RES plants in the areas within which hydrocarbon exploration and exploitation will no longer be permissible (Law 12/2019, as amended). The moratorium ended in September 2021, however, pending the Plan's final approval, the Ministry of Ecologic Transition officially announced that no new hydrocarbon exploration and exploitation activities will be authorised.

The above initiatives are reinforced by the fact that these countries -among others- have moved towards green energy and especially the development of offshore wind farms. More specifically, the French President announced that the goal is to achieve 40GW of offshore wind capacity by 2050. In this context, the current landmark project featuring the development of a 30MW floating wind farm in the Gulf of Lion and the recent launch of a tender process for the development of 250MW floating offshore wind farms in the Mediterranean should be highlighted. Accordingly, the Spanish government has approved an Offshore Wind Roadmap, which aims to install up to 3GW of floating offshore wind by 2030, while at the same time the process of developing the first 50MW floating wind farm in the Canary Islands has already started. Also, Italy has recently developed in Taranto the first of ten fixed offshore turbines, which will become the first offshore wind farm in the Mediterranean, with a total capacity of 30MW. In addition, Norway announced the country's first offshore wind auction, with a total capacity of 1.5GW, which is expected to take place within 2022. It is also worth noting that many states have entered into relevant interstate agreements. For instance, Greece has signed Memoranda of Understanding with third countries (i.e., India and the United Arab Emirates) to strengthen cooperation in the renewable energy sector, including offshore wind energy (see Law 4909/2020 and Law 4910/2022, respectively).

This trend is also strengthened by the current energy crisis as many states (e.g., Albania, Denmark, USA, Italy, Colombia, Sweden) made recent announcements (beginning of March 2022) on the launch of new plans to develop offshore wind farms. It is therefore evident that a growing number of countries tend to move away from hydrocarbon extraction and invest more and more in green energy in compliance with the set targets.

As for companies and especially major European ones, there is also a shift towards green energy and offshore wind farms with the ultimate goal of reaching net zero by 2050 (Murray, 2020). Indicatively, Spain's Repsol became the first energy company to undertake the above commitment, while French Total is transforming in accordance with the EU climate targets, seeking to be among the five leading renewable energy producers in 2030. To this end, the company gradually proceeds with selected investments in RES projects and plans to install 25GW of renewable energy capacity by 2025. Dutch Shell also intends to reach net zero by 2050 at the latest, with an intermediate target of a 30% emissions reduction by 2035. Finally, the UK's

BP has adopted the motto 'reimagining energy' with the aim of becoming a net zero company by 2050 while developing 50GW of RES capacity by 2030.

These companies, being active in the Mediterranean and Greece, are just some examples of the general trend that is taking place in the energy industry. Although in practice no significant progress has been achieved to date (Ember & Europe Beyond Coal, 2022), it should be particularly taken into account that the medium- and long-term investment plans clearly demonstrate industry's departure from the hydrocarbon extraction sector. All in all, the above tendency of states and companies is very likely to reduce interest in new high-cost and risky investments, especially in difficult-to-access and extremely deep sea areas.

Citizens demand compliance with emissions reduction commitments

While the perpetuation of the fossil fuel economy may guarantee energy security in the short term, at the same time and all the more in the long term it contributes to the emergence of economic, social and environmental risks that are further exacerbated in regions particularly vulnerable to the effects of climate change. As a result, the filing of appeals before both national and regional/international judicial bodies against European states as well as fossil fuel companies regarding the breach of the obligations they have undertaken to reduce emissions, has highly increased.

Indicatively, in the landmark climate change litigation *Urgenda case*, the Dutch Supreme Court ruled that the country has a positive obligation to take measures to prevent climate change by increasing its emissions reduction target, on the basis of the European Convention on Human Rights and in particular the right to life and the right to respect for private and family life of its citizens. On the same wavelength, in the recently pending case of *Union of Swiss Senior Women for Climate Protection v. Swiss Federal Council and Others*, an association of senior women took the Swiss government to the European Court of Human Rights, claiming that Switzerland's inadequate climate policies violate their rights to life and health.

In the case of *Neubauer et al. v. Germany*, the German Federal Constitutional Court found that the target of reducing emissions by 55% until 2030 set under the Germany's Federal Climate Protection Act was insufficient, resulting in a violation of the applicants' human rights as protected by the German constitution. Thus, the Court ordered the legislature to set clear provisions for reduction targets from 2031 onward and in response a bill passed setting emissions reduction target at a minimum rate of 65%.

Building on the above order and based on the new scientific data and developments crystallised in the Glasgow Climate Pact, a new appeal against Germany was filed within 2022 requesting a further increase in the emissions reduction target (*Steinmetz et al. v. Germany*). The same position was adopted by the Administrative Court of Paris in the case of *Notre Affaire à Tous and Others v. France*, adjudicating that the country has failed to fulfill its international commitments. Finally, a Dutch regional court recently ordered Shell to immediately reduce its emissions by 45% by 2030, marking the first court decision to hold that a private company failing to take appropriate reduction measures, violates the general duty of care as well as the respective human rights.

The hydrocarbon extraction scheme has no future

The above trends combined with the withdrawal of companies from existing lease agreements for the granting of hydrocarbon exploration and exploitation rights, indicate that the hydrocarbon extraction scheme has no future and therefore must be immediately abandoned.

This can be legally accomplished either with the lessees surrendering their rights over a contract area or with an amendment to the national framework.

In particular, a special provision is included in the lease agreements, according to which lessees, with written notice, may surrender their exploration rights in the entire contract area (or a part thereof) before the end of the exploration stage (Article 6). Also, lessees may transfer in whole or in part their interests as well as their rights and obligations under the agreements either to an independent third party or to any other co-lessee, solely upon written consent of the competent minister (Article 20). In light of the above contractual provisions, the Spanish Repsol recently withdrew from the Lease Agreement for the granting of hydrocarbon exploration and exploitation rights in the Ionian Block, in which it held a 50% interest while the remaining 50% belonged to Hellenic Petroleum (which now owns 100% of the rights). The said divestment decision was taken in the context of the readjustment of Repsol's business strategy, which includes, *inter alia*, the goal of reducing the company's annual upstream investments from 2.4 billion Euros in 2019 to 1.6 billion Euros in 2025. This withdrawal complements the generally unprofitable participation of energy companies in early-stage hydrocarbon projects in view of the green energy transition.

An important element which also needs to be taken into account is the possibility that the offshore areas, in which the rights to explore and exploit hydrocarbons have been granted, will instead be used for the installation of offshore wind farms by either the lessees themselves or other parties to whom the respective rights will be transferred. For this purpose, the suitability of those blocks for the production of offshore wind energy shall be considered. Currently, there is no relevant legislative provision in Greece. However, if the necessary conditions are met, the country could follow the steps of both France and Italy, as abovementioned, and adopt relevant provisions explicitly stipulating the change of purpose of the said areas and/or the replacement of existing hydrocarbon facilities, thereby allowing for the development of clean power plants such as offshore wind farms.

At the same time, Greece should follow the path that other European states have already begun to take by enacting a ban on any new hydrocarbon exploration and exploitation activities while preventing the extension of existing lease agreements. Although neither the new National Climate Law nor a recent series of energy-related legislation have included a relevant provision, despite the proposals submitted to the consultation, the necessary changes to be launched in order to secure energy supply in the short and medium term will definitely call for its incorporation, as part of the essential transition towards climate neutrality.

III. The potential of offshore wind energy

Taking all the above into consideration, it becomes clear that there are alternatives to the arguments for the need to continue or intensify the hydrocarbon exploration and extraction scheme. In this context, the installation of offshore wind farms is considered one of the most advantageous alternatives since it carries the most mature technology, as reaffirmed by the IPCC report of April 2022. Thus, the present section introduces the features as well as the advantages of developing offshore wind energy in Greece.

The wind energy potential of the Greek seas

According to a study prepared by researchers of the Aristotle University of Thessaloniki, which takes into account data on the wind energy potential provided by the Hellenic Centre for Marine Research (HCMR), there is a favourable prospect for the development of wind farms in specific marine areas, considering a series of criteria, such as the wind potential, the water depth, the connection to a high-voltage network, the limitations regarding other uses and the economic viability of the project (Spyridonidou et al., 2020). The great depth of the Greek seas no longer seems to pose a particular problem thanks to the improved technology of floating wind turbines and the reduction of their costs, both in terms of technological costs as well as of improving the nominal efficiency of the respective systems (NECP, 2019). At this point, it should be noted that unlike hydrocarbons, the country's offshore wind potential, especially in the Aegean, is a proven energy resource and not a presumptive one.

The social and economic benefits

Investing in the production of RES, including wind energy, can lead to a decoupling of the electricity price from the so-called energy exchange, in which fossil fuel price fluctuations for various -not only geopolitical- reasons, make the position of the importing countries rather difficult as the costs are passed on to consumers (Papastamatiou, 2022). Indicatively, the contribution of RES to the country's energy mix led to a 35% reduction in electricity price during December 2021 (HWEA/ELETAEN, 2022).

In the long term, increasing energy self-sufficiency through offshore wind farms can produce significant economic benefits, as it would lead to a reduction in energy imports, thereby having a positive effect on the trade balance and the public debt management. It should be highlighted that Greece pays annually 5.5 billion Euros to import fossil fuels, i.e. oil and fossil gas (Maniatis, 2021).

With regard to the sustainability of such investments, it is worth mentioning that the financial burden refers to the cost of design, installation, operation, interconnection with the network, and decommissioning or replacement when the equipment's life cycle is completed, given that the source (i.e., wind) is free, and therefore not subject to fluctuations due to the international economic environment or geopolitical tensions.

Job creation for the development, installation, operation, and decommissioning of offshore wind farms constitutes another aspect with economic and social ramifications that should be taken into consideration in state planning. The above is enhanced by the fact that Greece has skilled human resources (engineers and technicians) who could be employed in this sector. That being said, the example of Denmark is typical in this regard. According to the Roadmap 2023, during the period 2019-2024 five offshore wind energy production projects (in the North Sea) of approximately 700 MW are to be implemented, while in the next four years, according to the Roadmap 2030, an increase of 1GW per year in the country's offshore wind capacity is further planned. The increase in direct employment in the first five years is expected to reach 2,480 years of employment (including the jobs related to the construction of the wind turbines as well as the crews of the ships that install them) (Knol, Coolen, 2019). By all means, in the case of

Greece, the job allocation to local and domestic personnel as well as the employment of specialised staff from abroad should be duly investigated, mainly taking into account the current investment interest of Greek companies in the field of floating wind turbines construction (Tratsa, 2022). The strengthening of the construction sector is important for increasing the rate of the domestic staff's direct employment. In addition, the reinforcement of the domestic supply chain for the construction, installation, and operation of floating wind turbines should also be considered, as it involves different branches of the Greek economy, such as shipping, cable, cement, and steel industries (ASKT, 2020).

Furthermore, there should be an integrated planning and coordination in relation to domestic education and research when it comes to the sector at hand. A starting point can be the legal framework for industrial doctorates that was recently adopted (Art. 126, Law 4926/2022), while the new law on Higher Education Institutions (HEIs) (Law 4957/2022) also provides for the possibility of industrial research by university laboratories, through cooperation agreements with domestic or foreign companies or industries (Art. 49), and the University Research and Innovation Centres (Art. 131). The latter law also enables the interconnection of the research carried out in the HEIs with the industry through the establishment of Technology and Innovation Transfer Units (Art. 211).

Investing in offshore wind energy production can significantly contribute to the issue of energy self-sufficiency of the islands. To this end, there is a need for the creation of the appropriate RES energy mix, the integrated planning for feeding the grid, and the establishment of storage infrastructure. That being said, it is important to note that the recent legislation adopted in Greece on the modernisation of the licensing process for RES (Law 4951/2022), introduces the concept of offshore PV plants.

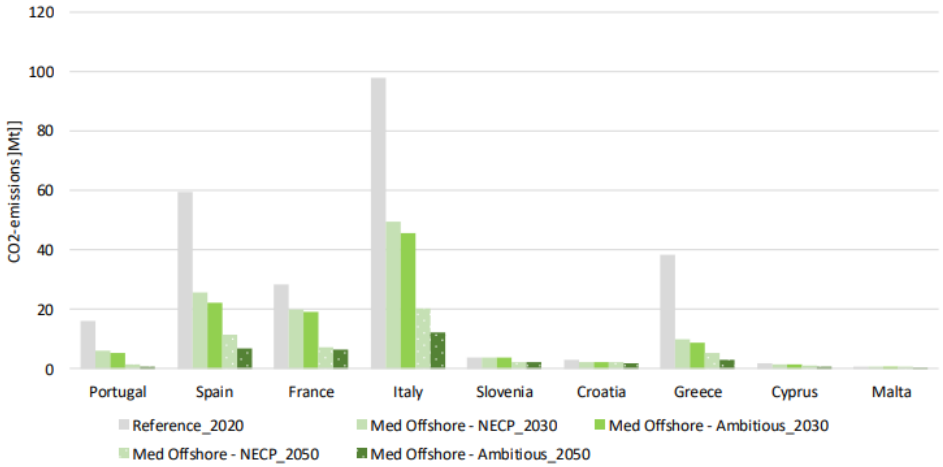
The prospects for a comprehensive planning which takes into account other maritime activities are also deemed interesting. To date, marine space management has been intertwined with the existence of exclusive use or protection zones. This approach, particularly in the context of maritime spatial planning (MSP), has begun to recede (Zervaki, 2016) and in the case of offshore wind farms there exist scientifically documented examples of the harmonious coexistence of different activities, while considering the needs to preserve biodiversity. The coexistence of aquaculture in offshore wind energy production sites is a typical example of this trend (European Commission, 2021).

In any case, offshore wind farms will contribute to regional development as they constitute a decentralised form of energy generation. This practically means that they spread throughout the territory, without leading local economies to 'monoculture', that being the case with the lignite areas at national and European level (The Toc, 2022).

Alignment with international and European climate targets

The integration of offshore wind farms into the broader strategy for the transition to clean energy and a zero-emission economy in line with the country's commitments appears to be a trend followed by many countries. Currently, 15GW of offshore wind farms have been installed in the European seas (28GW including the UK), while the continent's total capacity is 3,400TWh, with the potential to reach up to 450GW (70GW of which in the Mediterranean) until 2050. According to a study prepared for the European Commission, the reduction of carbon emissions in the Mediterranean countries is expected to become feasible due to the increase in offshore energy production facilities, including offshore wind energy.

Estimated reduction of CO_2 emissions from the development of offshore RES installations



Source: European Commission

At the European level, the policy making is clear: in November 2020, the European Commission published an EU strategy to harness the potential of offshore renewable energy (COM/2020/741 final). Achieving the EU's emissions reduction targets by 2030 and becoming climate neutral by 2050 requires scaling up the offshore wind sector, which is estimated to need less than 3% of Europe's marine space and, if properly sited, can be compatible with the objectives of the EU Biodiversity Strategy for 2030 (COM/2020/380 final). Under the former strategy, the EU's offshore wind capacity is proposed to increase from the current level of 12GW to at least 60GW by 2030 and 300GW by 2050. The Commission intends to complement this increase with 40GW of ocean energy and other emerging technologies such as floating wind and solar energy installations. In this regard, it becomes apparent that offshore wind energy production is high on the European agenda and funding.

It should also be emphasised that this perspective is followed by strong investment interest from third countries, such as Norway, which already explores cooperation opportunities for the joint development of floating wind farms in the Greek seas along with Greek companies (Liagou, 2021). Accordingly, there is also interest from institutional financial institutions that turn away from fossil fuels as well as the private sector as mentioned earlier in this text. Therefore, it would not be an exaggeration to claim that offshore wind energy, in which value-added investments are planned, will become a major source of energy in Europe by 2040.

Adapting to the changing geopolitical environment

Considering the tectonic changes taking place in the field of energy today through the clean energy investments, the impact on geopolitical reality, as crystallised during the 20th century, will soon be outdated. The decarbonisation of economies and commitments in addressing climate change generate the separation of geopolitical advantages that states enjoyed from the production and, above all, the export of fossil fuels. The current energy crisis and the war in Ukraine will not increase interest in new fossil fuel investments. On the contrary, they inevitably lead to the acceleration of the green energy transition. As mentioned above, the REPowerEU plan prioritises the transition to clean energy, including offshore wind energy, calling on Member States to ensure that "*the planning, construction and operation of plants for the production of energy from renewable sources, their connection to the grid and the related grid itself are considered as being in the overriding public interest and in the interest of public safety*". In this context, Member States should "*swiftly map, assess and ensure suitable land and sea areas that are available for renewable energy projects, commensurate with their national energy and climate plans, the contributions towards the revised 2030 renewable energy target and other*

factors such as the availability of resources, grid infrastructure and the targets of the EU Biodiversity Strategy" (European Commission, 2022).

From the above it is deduced that the global geopolitical reality is going to change radically and sooner than originally planned: international politics will not be influenced by the supply or non-supply) of oil or gas and the power of states will be decoupled from access to fossil fuels. As a result, the today's advantage of Middle Eastern states or Russia and Caucasus states in the international energy chessboard will receive a significant blow (Hook, Sanderson, 2021). Conversely, states that have invested in RES will be geopolitically upgraded due to the independence of their economy from fossil fuel imports. The example of Norway which, although an oil producing country, in its national planning seems to invest in renewable energy sources -instead of oil- is typical. Indeed, the development of offshore wind farms is now a priority axis of both the Norwegian strategy for research and the country's integrated ocean management plans (Norwegian Ministry of Climate and Environment, 2020).

In addition, the shift of interest to the creation of infrastructure for transnational interconnection in the field of clean electricity (on the model of the Greece-Egypt interconnection) will give a new impetus to regional cooperation and understanding, initiating a new type of security communities. Pipeline diplomacy, at least in the Eastern Mediterranean, seems to be giving way to the diplomacy of the 'cables' with the establishment of interconnected power generation communities through RES. Following the Memorandum of Cooperation signed between Greece and Egypt, the planned project for the electric interconnection of Crete-Cyprus and Cyprus-Israel (Euro-Asia Connector) with the financing of the European Commission, shows that we are moving into this direction.

At the regional level, the development of offshore wind farms can relieve the competition and increasing claims to marine space, which were created in anticipation of the discovery of fossil fuel deposits. In this context, there are several parameters that should be taken into consideration.

First of all, wind's renewable nature does not deprive neighbouring countries of respective investment prospects. Therefore, the element of competition for the control over energy resources is missing, thereby creating the conditions for the resolution of any delimitation dispute as well as for cooperation in the implementation of both RES and energy interconnection projects.

Moreover, the short distance of offshore wind farms from the land -mostly for reasons of interconnection with the mainland grid- is a decisive parameter for the realisation of such investments. A typical example is the ongoing implementation of a relevant project in Puglia (Italy), near the port of Taranto, at a distance of 3km from the coast (Lewis, 2022; The Wind Power, 2022) in combination with the tendency so far to fixed-bottom wind farms due to wider installation techniques available. The preference for the realisation of such investments within territorial waters creates a bulwark against any third state claims that may arise in undelimited areas in the continental shelf or the EEZ. Even in marine areas of great depth, where the solution of floating wind turbines is a one-way street, the connection -and therefore the short distance- to land remains a decisive factor for the exact location of such an investment. Even in the case of Greece, where due to its marine space geomorphology (great depths) the floating technology is considered more appropriate, the materialisation of such an investment can also take place within territorial waters.

Finally, the development of offshore wind farms in areas beyond territorial waters can further exploit the continental shelf regime in the case of fixed-bottom wind turbines as well as the EEZ regime in the case of floating wind turbines in the superjacent waters. The recent EEZ delimitation agreements with Italy (the EEZ proclamation is still pending) and Egypt create the

prospects for expanding such investment projects initially in the Ionian and south off Crete, but also in other areas in the future, pursuant to the provisions of the international law of the sea (see next section).

Taking all the above into consideration, it is safe to conclude that for Greece, the exploitation of its offshore wind potential can serve a twofold goal: first, greater energy autonomy, and second, geopolitical upgrade of the country's role in the wider region.

IV. Institutional Challenges

The present section examines the institutional challenges arising from the advocacy of offshore wind farms development. The first category of challenges concerns the application of the international law of the sea, the second the implementation of the recently adopted legal framework, and the third the spatial distribution of activities in marine areas.

Offshore wind farms and the Law of the Sea

Today, there is greater potential for spatial development of offshore wind farms in the Greek seas compared to the past. In particular, apart from its 6-nm breadth (Law 230/1936), recently Greece extended its territorial sea to 12nm in the area from the northernmost point of the Ionian Islands Region to Cape Tainaro in the Peloponnese (Law 4767/2021). Therefore, the country has the possibility to install wind farms in marine areas over which it exercises exclusive jurisdiction, i.e. within the 12-nm territorial sea in the Ionian and within 6nm throughout the rest of its territory (with the exception of certain points where the geomorphology does not allow the above extension, thus the customary principle of equidistance/median line applies). Beyond its territorial waters, Greece can also exploit both its continental shelf and EEZ (see Table 1).

At this point the following distinction must be made: over the continental shelf, the coastal state exercises sovereign rights for the exclusive purpose of exploring and exploiting mineral and other non-living resources of the seabed and subsoil, such as hydrocarbon deposits (Art. 77 paras 1 & 4, LOSC). The said regulatory framework also covers the installation of fixed-bottom wind farms and especially the drilling for the placement of their foundations (Art. 81, LOSC; Scovazzi & Tani, 2014). On the contrary, the EEZ regime provides more complete protection of the coastal state's and potential investors' interests in the exploitation of alternative forms of energy production, including wind energy. That is because the sovereign rights of the coastal state are expanded for the purpose of exploring and exploiting, conserving and managing all natural resources, whether living or non-living, of the waters superjacent to the seabed (apart from the seabed and subsoil), and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from, *inter alia*, the winds (Art. 56 para. 1, LOSC). Therefore, while the continental shelf regime offers a more adequate legal basis for traditional forms of energy production, such as the exploration and exploitation of hydrocarbons, the exploitation of new forms of energy production requires the proclamation of an EEZ (Gavouneli, 2016) as its respective regulatory framework on the one hand provides full protection and on the other hand covers also the installation of floating wind turbines in the superjacent waters apart from fixed-bottom ones.

Table 1: Maritime zones and permitted energy activities therein

Maritime Zone	Definition	Permitted Energy Activities
Internal Waters	Waters which lie landward of the baseline from which the territorial sea is measured (e.g., bays, ports, and estuaries). Every coastal state enjoys full sovereignty over its internal waters.	The coastal state has the exclusive jurisdiction to regulate energy production and to develop energy installations of all types within its internal waters, subject to any restrictions imposed by its domestic law (see e.g., *minimum* distance from the coast).
Territorial Sea (or Territorial Waters)	A marine zone, the limit of which does not exceed 12nm measured from baselines. The coastal state	The coastal state has the exclusive jurisdiction to regulate the development,

	enjoys full sovereignty over it in the sense that it exercises complete legislative and enforcement jurisdiction over all matters and all people in an exclusive manner unless international law provides otherwise. The territorial sea comprises the seabed and its subsoil, the adjacent waters, and its airspace.	licensing, and in general every aspect of energy installations for the exploitation of either hydrocarbons or wind energy.
Continental Shelf	A maritime zone which comprises the seabed and subsoil of the submarine areas that extend beyond a coastal state's territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200nm from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance. The continental shelf exists *ipso facto* and *ab initio*, meaning that it does not require proclamation in order to be established. The inherent sovereign rights that the coastal state exercises over it relate to the exploration and exploitation of mineral and other non-living resources as well as sedentary species of the seabed and subsoil.	The coastal state has exclusive jurisdiction over the construction and regulation of the licensing, operation and use of energy installations for the exploration and exploitation of hydrocarbons. It also has the right to install fixed-bottom offshore wind farms.
Exclusive Economic Zone (EEZ)	A maritime zone which lies beyond and adjacent to the territorial sea, not extending beyond 200nm from the baseline of the territorial sea. The coastal state exercises sovereign rights for the purpose of exploring and exploiting, conserving, and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds. Third states enjoy the high seas freedoms of navigation, overflight, laying of submarine cables and pipelines, and other related internationally lawful uses of the sea, under the condition they have due regard to the rights	The coastal state has exclusive jurisdiction over the construction and regulation of the licensing, operation and use of energy installations for the purpose of wind energy production. The EEZ regulatory framework covers apart from fixed-bottom wind farms, also the installation of floating wind turbines in superjacent waters.

	and duties of the coastal state. Unlike the continental shelf, the coastal state must proclaim an EEZ in order to establish it.	
High Seas	All parts of the sea which lie beyond national jurisdiction. Where a coastal state has established its EEZ, the landward limit of the high seas is the seaward limit of the EEZ. Where the coastal State has not proclaimed its EEZ, the landward limit of the high seas is the seaward limit of the territorial sea. In the high seas, the jurisdiction of the coastal state disappears to be replaced by the absolute authority of the flag state.	All states can develop and operate all kinds of energy installations in the high seas, as an exercise of one of its freedoms, namely the freedom to construct installations. The said freedom should be exercised in accordance with the LOSC as well as other rules of international law, with due regard for the interests of other states. Also, the freedom does not entail privileged access or protection safeguards.

Considering the necessity of delimiting overlapping maritime zones in a narrow, semi-enclosed sea as the Mediterranean, to date Greece has signed three delimitation agreements. Regarding the Ionian Sea, it has signed with Italy the 1977 Agreement under which the two countries delimited their continental shelves and recently the 2020 Agreement (Law 4716/2020) pursuant to which they established a boundary line of the remaining maritime zones, i.e. their EEZs, along the continental shelf boundary set up under the 1977 Agreement. Therefore, Greece has the potential to install fixed-bottom offshore wind farms on its delimited continental shelf and as soon as it proceeds with the proclamation of its delimited EEZ with the issuance of a presidential decree, it will also be able to develop floating wind energy production in the area.

Also, the country recently signed a Delimitation Agreement with Egypt (Law 4717/2020), in which the two states established for the first time a partial delimitation line of their EEZs in the area south off Crete and Rhodes. On the basis of Art. 2 of Law 4717/2020, Greece also proclaimed its EEZ in the area at hand. Therefore, the country has the potential to install offshore wind farms (both fixed-bottom and floating) in the now partially delimited area.

It is noted that according to Greek legislation (Art. 156 para. 1, Law 4001/2011), in the absence of a delimitation agreement with neighbouring states, the outer limit of the country's continental shelf and EEZ (if proclaimed) coincides with the median line. Thus, Greece has also the right to install offshore wind farms in the marine areas that lie within the medial line of the continental shelf and -if proclaimed- EEZ, throughout its territory.

It is crucial to highlight that both hydrocarbon extraction and the development of fixed-bottom offshore wind farms are two sides of the same coin when it comes to the exercise of a coastal state's sovereign rights over its continental shelf. In other words, whichever technology is developed on the Greek continental shelf, it will have exactly the same impact on securing the country's interests in that particular maritime zone. Therefore, the concession blocks for the exploration and exploitation of hydrocarbons (e.g., the Southwest of Crete block) could instead be used for the installation of fixed-bottom offshore wind farms, producing the exact same result. On the other hand, the development of floating wind farms requires the proclamation (and delimitation in overlapping areas) of an EEZ since the superjacent waters used for the installation of the said farms, fall under the EEZ regime. Consequently, proceeding with the proclamation of an EEZ is necessary for securing the interests of Greece through the installation of floating wind farms. In this context, the fact that Greece recently concluded the

aforementioned EEZ delimitation agreements and partially established it in the area south off Crete and Rhodes, is an indication of the country's strategic goals. Finally, it is to be noted that in any case all states can develop all kinds of energy installations in the high seas, thereby exercising their freedom to construct installations, in accordance with the LOSC as well as other rules of international law, with due regard for the interests of other states (Art. 87 paras 1-2, LOSC). However, the said freedom is governed by a 'first come first served' rationale and entails no privileged access or protection safeguards. It should also be mentioned that the freedom applies likewise in case that a coastal state has not proclaimed an EEZ, since the superjacent waters of the continental shelf fall under the regime of the high seas.

The new Law 4964/2022 on the development of offshore wind farms

Despite all the goals set and the high wind potential presented by the Greek seas, the regulation of offshore wind farms took place very recently with the adoption of the new Law 4964/2022 on the 28th of July 2022. The need to establish a comprehensive legislative framework in Greece was imperative since any attempts that had been made during the last years were scattered, unclear and incomplete, while the previous framework was particularly problematic and time-consuming.

With the implementation of the new framework, the installation and operation of offshore wind farms becomes feasible. The relevant development model is purely hybrid (i.e., the state selects certain marine areas through a complex process, which evolves up to a point in cooperation with prospective investors and then hands the project over to the respective investor for completion and exploitation). The key stages of the development process are summarised in chronological order below:

- Adoption of a National Programme for the Development of Offshore Wind Farms, outlining in which marine areas of the country the development of such farms is possible.
- Demarcation of one or more Offshore Wind Development Areas from the above defined marine areas.
- Granting Offshore Wind Research Permits within the demarcated Offshore Wind Development Areas to interested investors who meet the technical and financial criteria set by law.
- Conduct of studies and measurements within the Offshore Wind Development Areas by the holders of Research Permits.
- Delineation of Offshore Wind Installation Zones (within the Offshore Wind Development Areas) and assessment of the projects' *maximum* power capacity in each of them, following a period of approximately 2.5 years from the granting of Research Permits.
- Auctions for each Installation Zone in order for the holders of Research Permits to be supported during offshore wind development.
- Successful bidders will acquire the exclusive right to develop, construct, and operate offshore wind farms in the defined Installation Zones.

The above distinct stages are part of a long-term, highly complex, and costly for prospective investors process with the development of the first offshore wind farm projects being expected to take place around 2030. It is also important to mention the criticality of the prompt issuance of the required by the said law secondary regulatory acts so that the designation of the respective marine areas can immediately begin (Aposporis, 2022). Naturally, this process should run parallel to the development of a complete spatial planning that will take into account the technical needs of marine RES, while ensuring the protection of the marine environment and offshore wind farms' harmonious coexistence with other activities, such as fishing, tourism, and navigation (see next subsection). Also, great significance should be given to the determination of

the interconnection process with the Hellenic Electricity Transmission System, which entails difficulties especially with regard to the non-interconnected islands and also the issue of submarine cables, which on the one hand are necessary for the installation and operation of floating wind farms and on the other hand notably increase the relevant costs.

The target of offshore wind energy's installed capacity until 2030 has already been revised upwards, i.e. to 2GW, according to recent official statements by the Prime Minister. This objective is expected to be incorporated in the National Energy and Climate Plan (NECP), being currently under review. Moreover, it is noted that the installation of offshore wind farms is also based on the National Strategy for an integrated marine policy, in the context of which specific development goals have been set for investments in the blue economy, such as marine RES (Art. 4 para. 1(e), Law 4832/2021).

From the above, it becomes clear that the newly adopted law constitutes the necessary ticket for the exploitation of the country's high wind potential through the introduction of a new sector in the Greek market in light of sustainable development and the further penetration of RES on the basis of the established international, EU and national objectives. Therefore, speeding up its implementation is deemed crucial.

The spatial planning of energy activities at sea

Maritime spatial planning (MSP) plays a key role in the development of offshore wind farms. In this context, the extension of territorial waters in the Ionian Sea as well as the (partial) delimitation of the EEZ with Egypt seem to create new prospects for the installation of offshore wind farms in areas where Greece exercises sovereignty and sovereign rights, respectively.

In particular, MSP is vital for the establishment of a safe investment environment. At the same time, it addresses the issues derived from competing uses and the need to protect marine space and biodiversity. Therefore, the proper spatial planning of offshore energy production installations along with their interconnection infrastructures is a necessary condition for adopting a modern strategy in the field. It is also noted that the preparation of an MSP constitutes an obligation of the Member States under European legislation. Thus, in the present subsection, the rationale of the MSP concept at the European level as well as the relative progress made by Greece, are presented.

The European framework for MSP

Directive 2014/89/EU, which establishes the framework for MSP in the EU, is inspired by the energy strategy of the 2000s. In terms of marine energy resources, the said text shows the priority at the time, i.e. the fossil fuel extraction investments. The Directive adopts the objective of "*…[increasing] investment in the EU's existing natural assets*" of the 2020 European Strategy. Notwithstanding that the technology for the production of offshore wind energy was included in the Commission's priorities (Strategy for Blue Growth), at the same time it was acknowledged that it was not yet in a mature development stage. In this direction, the 2014 MSP Directive makes explicit reference to the spatial planning of activities for the exploration and exploitation of fossil fuels, in contrast to the general references to activities related to RES production (see the preamble as well as Arts 6 and 8). It is worth noting that offshore wind farms are not even mentioned therein.

In accordance with the 2014 MSP Directive, the framework for MSP includes:
(a) land-sea interactions. This element is important as it is linked to onshore storage facilities, as well as the establishment and operation of energy transmission networks. The relevant planning should be carried out comprehensively, taking into account the wider planning in

relation to the submarine pipelines and power transmission cables or the connection of facilities in the case of interconnecting island areas or transferring energy in the context of cross-border projects.

(b) environmental, economic and social aspects, as well as safety aspects. The concept of safety is mainly related to safety from accidents (prevention and response). The environmental aspects are linked to the institutional framework regarding the strategic environmental assessment (Directive 2001/42/EC), which is mandatory for energy plans and programmes, and the environmental impact assessment (Directive 2014/52/EU). In this context, EU environmental legislation, especially with regard to protected areas (e.g., Natura 2000 network based on Directives 2009/147/EC and 92/43/EEC), but also in conjunction with the relevant legislation for the safety of oil and gas operations (Directive 2013/30/EU) and the prevention of accidents from industrial activities as well as the limitation of their hazards on the environment and health (Directive 2012/18/EU), should be taken into account. Economic aspects are based on the concept of 'sustainable blue economy' (European Commission, 2021) and the European Green Deal which fosters, *inter alia*, the contribution to "carbon neutrality by developing offshore renewable energy". Finally, the social dimension focuses on job creation. The above Communication from the Commission states that "in the offshore wind energy sector alone, the number of jobs could triple by 2030".

(c) spatial and temporal distribution of activities and uses in marine waters. The main objective of MSP is the harmonious and sustainable coexistence of different activities and uses of the marine space based on an ecosystem-based approach. In this context, the 2014 MSP Directive attempts to go beyond the traditional single-use zoning, which excluded the coexistence of different activities, as long as this is feasible and falls within the planning of each Member State (Zervaki, 2016).

Following the report on the implementation of the said Directive in the Member States, the European Commission is expected to prepare proposals on "*how the Commission can facilitate cross-border cooperation and encourage Member States to integrate objectives of offshore renewable energy development in their national spatial plans*" (European Commission, 2021).

The implementation of the 2014 MSP Directive in Greece

Greece transposed the 2014 MSP Directive with a long delay by adopting Law 4546/2018 and submitted for public consultation a draft version of the National Spatial Planning Strategy for the Marine Space at the beginning of 2022. Although the consultation is over, the processing of its comments has not yet been completed, nor has a final text version been formally submitted for approval. Therefore, an integrated approach to MSP has not been implemented so far. Moreover, the establishment of a new MSP framework covering, *inter alia*, renewable energy sources, has been included in the reforms that will be implemented with the support of the Recovery and Resilience Facility by 2025. On the contrary, *ad hoc* aspects of MSP are found in the special frameworks for spatial planning for aquaculture and RES as well as in regional frameworks.

Regarding the spatial planning of wind farms, the existing framework comprises the 2008 Special Framework for Spatial Planning for RES (currently under review). This Framework sets certain criteria for the development of offshore wind farms (Art. 10), which impose specific spatial restrictions in the installation of wind turbines at sea. The criteria include:
(a) the wind capacity of the area, without quantifying what constitutes sufficient capacity to carry out such an investment,
(b) the *minimum* distances to ensure the functionality and performance of the installations, with specifications referring mostly to wind installations on the mainland and islands,

(c) the possibilities of interconnection with the mainland or islands, without further details, and (d) the limitation that an installation ban or exclusion zone regime applies. In particular, it is prohibited to develop offshore wind farms in statutory marine or underwater parks, established passenger shipping lanes, world cultural heritage sites (Greece does not have such underwater sites), and underwater archaeological sites, while in the case of floating wind farms anchoring is also banned. Likewise, nature protection areas, areas of absolute protection, priority natural habitats that have been included in Natura 2000 network as well as wetlands of international importance are excluded. Especially for the Special Protection Areas (SPAs) for the conservation of wild birds (Directive 79/409/EEC), it is noted that a special study is a prerequisite in order for offshore wind farms to be installed. Finally, there are specific spatial criteria regarding the distance from bathing sites, settlements (including traditional ones), and holy monasteries.

Taking into account the progress that has been made in offshore energy production technology, the country's energy, climate and biodiversity targets, but also the lessons learned from onshore wind energy installations until today, the revision of the Special Framework for Spatial Planning for RES in accordance with the main directions of the National Spatial Planning Strategy for the Marine Space is deemed rather necessary.

At this point, two main policy pillars of the pending National Spatial Planning Strategy for the Marine Space shall be examined.

The first pillar is the National Energy and Climate Plan (NECP) which is currently under review in order to incorporate the goal of transitioning to a climate neutral economy by the year 2050. According to the National Spatial Planning Strategy for the Marine Space, under NECP's implementation "the development of offshore wind farms along with the establishment of an appropriate licensing framework is promoted", while the reference to the Multiannual National Strategic Plan for the development of aquaculture (2014-2020) in Greece, which implies the prospect of the combined development of aquaculture and RES, is worth mentioning. It should be noted that the goal of "*replacing the use of oil and lignite with gas, […] as a transition fuel towards the reduction of greenhouse gas emissions*" and the "*promotion of gas in specific sectors of final consumption to replace the use of petroleum products*" still remain in the text of the National Spatial Planning Strategy for the Marine Space. However, as earlier mentioned, the need for the acceleration of energy independence from Russia calls into question the narrative that fossil gas constitutes the fuel that will contribute to the smooth transition towards climate neutrality.

It is worth noting that the National Spatial Planning Strategy for the Marine Space makes reference to hydrocarbon extraction, emphasising that -with the exception of gas- "*minimal amounts of fossil fuels [will] remain in the energy balance in the year 2050*". It also recognises that "*hydrocarbon extraction is not an activity that is consistent with the general European and Greek climate planning*" and that the spatial planning of hydrocarbon activities should be carried out in such a way that "*the possible impacts on the natural and man-made environment*" are minimised. Finally, special mention is also made of marine noise pollution caused by the exploration and exploitation of oil and gas deposits.

The second policy pillar is linked to regional spatial planning frameworks and the designation of areas for the organised development of productive activities pursuant to Law 2742/1999 (which amended Law 1650/1986). In particular, under Art. 10 of Law 2742/1999, the characterisation of such areas is carried out in accordance with the directions of approved regional spatial planning frameworks. However, the majority of the latter frameworks make only general reference to the exploitation of wind-energy resources and the use of marine space for this purpose instead of defining particular areas. The only exception is the Regional Spatial Planning Framework of the Ionian Islands which cites specific areas within the Regional Unit of Corfu, while a reference is also made to the Regional Spatial Planning Framework of the North Aegean yet without specific allusion to locations. At the same time, the absence of references to

the Regional Spatial Planning Frameworks of Crete, Epirus, and Western Greece is resounding. With regard to the hydrocarbon exploitation in marine areas, the most precise Regional Spatial Planning Framework is that of Eastern Macedonia & Thrace (given the operation of the Prinos unit), while it imitates the Framework of the Ionian Islands when it comes to determining specific areas. With the completion of the adoption process of the National Spatial Planning Strategy for the Marine Space, the regional spatial planning frameworks should also be immediately revised in order to determine the appropriate areas for the installation of offshore wind farms. In this way, the attraction of investment interest for the development of such projects will be secured, as well as their integration into existing European and national funding programmes.

V. From 'lagging behind' towards becoming a green energy hub in the Mediterranean

The war in Ukraine and the energy crisis triggered developments in the phase-out of imported fossil fuels. Combined with the wider context of international, European, and national political pursuit of a zero-emissions economy, the acceleration of the green energy transition becomes a one-way street.

Trends show that the green energy transition path does not include new investments in hydrocarbon extraction, and certainly not in marine areas described by difficult access and geopolitical tensions requiring high-cost and high-risk investments. Instead, the winds are more favourable towards the further development of RES, especially offshore wind energy, where technology is now mature. Under the European objective of increasing offshore wind, Greece should undoubtedly speed up the procedures. So far, although the installation of offshore wind farms has been provided for by Greek legislation since 2008, no such investment has taken place. In this regard, the newly adopted Law 4964/2022 aspires to fill the gap and kick-start offshore wind development.

The rapid transition to RES and the replacement of the hydrocarbon extraction scheme with the development of offshore wind farms can act as a deterrent to the creation of geopolitical tensions, thereby upgrading the role of Greece as an energy provider and promoting a model of cooperation and interconnectivity in the wider region. The country can actually become a pioneer in an emerging energy market. At the same time, it will ensure energy self-sufficiency in order to prevent the next crisis.

To conclude, energy crises entail serious economic consequences. However, they are also catalysts for new steps in enhancing energy security, diversifying energy sources, as well as managing investments in energy research, production, and transport. Taking all the above into account, it is apparent that Greece can and should be ahead of this path.

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