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Just Transition Mechanism and Lignite Phase-Out in Greece: Challenges and Proposals for Policy Adoption

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Abstract

The guidelines for the future of the energy sector in Greece are largely determined by the relevant strategic decisions of the European Union. A key role in this context is played by the EU's Energy Union Strategy, which seeks to ensure secure, sustainable, competitive and affordable energy for EU citizens and businesses. Therefore, the radical transformation of the energy sector in Greece, as part of the European Union's strategy to achieve the long-term goal of climate neutrality by 2050, will require in the next few years significant investments for the just transition of the lignite-dependent regions, which will be disproportionately affected. In this paper, Greece's energy deficit is examined, as well as Just Transition Mechanism and its contribution to the ongoing green transition of the Greek energy sector. By attempting to identify the systemic inexpediciencies of the energy sector in Greece, the aim of this paper is to paint a realistic picture of the country's lignite phase-out plan and the challenges it faces during the ongoing energy crisis. It is concluded that the green and just transition is a long process, which requires strategic planning and a policy framework with clear implementation objectives and timetables.

Keywords: Just Transition Mechanism; Lignite Phase-Out; Energy Sector; Energy Crisis; Multiannual Financial Framework; SDAM; Green and Last Transition; Energy Deficit; GHG Emissions; Lignite-Dependent Regions;

Introduction

The European Union (EU) is committed to achieve the elimination of greenhouse gas (GHG) emissions by 2050 and has incorporated this target into the European Green Deal adopted in 2020. In this context, in January 2020, the European Commission proposed the Just Transition Mechanism; a key tool to help European regions whose economies are most dependent on fossil fuels to alleviate the socio-economic impact of the transition to a sustainable economy. Concerning Greece, by 2028, lignite-fired power plants will have ceased to operate in the region and this commitment will, inevitably, have significant consequences. This paper aims to examine the lignite

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phase-out in Greece in order to identify the systemic inexpediencies of the energy sector in Greece and the policy orientation required in order to increase the country's energy security and reduce dependence from energy imports. In the first section, systemic deficiencies in the Greek energy sector and the implications of the ongoing global energy crisis are analyzed. In the second section, EU financial instruments fiscal instruments concerning the just and green transition (Multiannual Financial Framework, European Green Deal Investment Plan and the Just Transition Mechanism) are presented. Finally, the challenges of Greece's decarbonization plan are discussed for the design of a resilient energy policy.

Systemic inexpediencies of the energy sector in Greece and the energy crisis of 2021

According to Squalli (2007), an economy, constrained by mismanagement of resources, could bring forward inefficiencies and the diminution in the demand for goods and services, including energy consumption. Energy is an input in the production process because it is used for commercial (transport, industry, and the manufacturing sector as well as the services sector and tourism) and non-commercial (public sector) activities. Therefore, (secondary effects on inflation notwithstanding) energy has a direct link to a country's Gross Domestic Product (GDP) and, due to this positive correlation between energy and economic growth, any negative impact on energy, such as rising energy prices (imbalances in the supply – demand chain) or the impact of “damaging” energy policies, will have a negative impact on GDP (Sharma, 2010). Regarding Greece, one of the most basic elements of its energy sector concerns is the reliance of the Greek economy on fossil fuels (namely coal, oil and natural gas), as well as its high dependency on primary energy imports. According to U.S. Energy Information Administration, energy consumption in Greece reached 1.17 quadrillion British Thermal Unit (Btu) in 2019, while its energy conversion reached 0.3 quad. Btu., indicating an overall energy deficit of 87%, directly burdening the current account balance (which posted at a deficit of 6.7% in 2020) (ΔιαΝΕΟσις, 2021). Furthermore, the energy deficit in question seems to contribute negatively to the country's GDP and public debt (which exceeded €388.49 billion in July 2021). Thus, Greece's gross debt as a percentage of GDP stood at 236% of GDP in July, compared to 233% of Japan, which has the next worst indicator (OECD iLibrary, 2021).

The Greek energy deficit is mainly covered by primary energy imports (470 million barrels per day (Mb/d) and 184 billion cubic feet (bcf) of oil and natural gas respectively), and -to a lesser extent- by domestic energy conversion of Renewable Energy Sources (RES) (0.159 Btu) and coal (0.133 Btu). Meanwhile, the share of domestic crude oil and natural gas extraction is still very small (17 Mb/d and 0.4 bcf respectively) (EIA, 2019a; 2019b). As far as electricity is concerned, Greece's

total electricity generation reached 47 billion kWh in 2019, whereas net electricity consumption was at 54 billion kWh, marking another deficit of 7% (EIA, 2019c; 2019d). More specifically, fossil fuels generated 30 billion kWh, while Renewables or RES produced the remaining 17 billion kWh; of which hydroelectricity and non-hydroelectric renewables generated 4 billion kWh and 13 billion kWh respectively (EIA, 2019c).

In the context of energy security, Greece's energy dependency is an issue that is directly affected by hydrocarbon exploration and exploitation. Overall, the dependence rate on energy imports in Greece was 70.5% in 2018, compared to 58.2% in the European Union (EU), indicating its inextricable energy reliance compared to most of the other EU Member States (ΔιαΝΕΟσις, 2021). The energy dependency is due to the particularly high use of petroleum products and natural gas, which cumulatively cover more than 65% of gross energy consumption and are almost entirely imported from countries outside the European Economic Area (Lypiridi, 2021). Greece, in particular, seems to be energy dependent on Turkey, because currently about 70% of natural gas imports pass through a pipeline system located on Turkish territory (Stampolis, 2021); the rest is imported in the form of Liquefied Natural Gas (LNG) through the Hellenic Gas Transmission System Operator (DESFA) terminal in Revithoussa from the U.S. (48%), Qatar (22%), Nigeria, Algeria (9%), Norway, Egypt, the Netherlands and France (3%) (DESFA, 2021). Natural gas currently occupies the largest percentage of Greek energy balance (especially after the gradual lignite phase out and the decommissioning of all of Public Power Corporation's (PPC) lignite plants by 2028) (RAE, 2020).

Moreover, despite the discovery of potentially commercially exploitable oil and gas deposits in various parts of Greek territory (e.g. "Epanomi" natural gas field) and the estimates for an underwater natural gas field in the Eastern Mediterranean (e.g. "Talos" natural gas field in South Crete), Greece has not proceeded with their exploitation, resulting in importing almost 100% of its present hydrocarbon needs; excluding the only domestically productive off-shore oil field in the region of Kavala-Thassos (Prinos oil field) (Lypiridi, 2021). It is also noteworthy that Greece already imports 11 billion kWh of electrical energy via undersea and underground electricity interconnections with Italy and Bulgaria (EIA, 2019e), while recently signed a new memorandum of energy cooperation with Egypt regarding the electrical interconnection of the two countries through an undersea cable that will transmit power produced by renewables (EuroAfrica Interconnector, 2021). These figures highlight the country's significant energy dependence on energy imports and, consequently, the intensification of its energy reliance on external energy

suppliers, undermining its energy security and autonomy as well as its public debt and economic output.

An energy crisis seems to be underway comparable with the early 1970s oil crisis. Energy prices are soaring, as demand from the economies that are recovering from the COVID-19 shutdown is not covered by supply. This record increase in global energy prices can be attributed to a number of factors. Firstly, it is theorized that the energy price increase is mainly due to the increased demand, as economic activity returns to pre-pandemic levels, as well as due to the still on-going supply chain disruptions caused by the pandemic (Toyrkochorititis, 2021). Secondly, it is considered that the increasing restrictions placed on traditional energy sources have resulted in the so-called “green inflation” price spike (Rees, 2021). Government regulators have been increasingly working in recent years to encourage the use of renewable energy in order to meet the 2050 net zero targets. Consequently, this aggressive push towards RES adoption, the expanded use of “green” technologies that are not cost-effective yet and the underinvestment in the development of European and American oil and gas fields during the 2015-2021 period (Toyrkochorititis, 2021), have led to energy supplies insufficient to meet growing demand. Furthermore, as rising energy prices influence economic decisions throughout the supply chain, they have had a significant impact on commodity markets. Plans to intensify “green” investments after the COVID-19 pandemic, particularly in “clean” energy, and the adoption of “green” energy policies (e.g., carbon taxes imposed by EU Emissions Trading System - EU ETS) have resulted in increasingly high prices for certain raw materials such as rare earths that are crucial components for RES technologies. In this context, EU countries agreed to set aside 37% of the EU Recovery Fund exclusively for the green transition (€265 billion out of the total €672.5 available) (Taylor, 2021), a decision that directly affects the Greek energy sector policy making.

Multiannual Financial Framework, European Green Deal Investment Plan and the Just Transition Mechanism

The European Union is committed to become the world's first climate-neutral region by 2050. To this end, it is engaged to increase public investment and help free up private capital through a variety of EU financial instruments. The Multiannual Financial Framework (MFF), or the EU budget, concerns the Union's new Community budget for 2021-2027 of €1,210 trillion (in current prices) and includes all EU funds, including cohesion policy resources (European Structural and Investment Funds – ESI Funds) and resources allocated through the NextGenerationEU recovery instrument of €806.9 billion (in current prices) (European Parliament, 2021). NextGenerationEU aims at the immediate repair of the socioeconomic impact caused by the COVID-19 pandemic,

by investing, inter alia, in environmentally-friendly technologies, establishing greener vehicles and public transport, and making buildings and public spaces more energy efficient (European Commission, 2021). The Recovery and Resilience Facility is a central component of NextGenerationEU with €723.8 billion (in current prices) in loans and grants that can be used to support reforms and investments taken on by EU Member States. It aspires to be a tool that will provide Member States with financial support to restart their economies, accelerate public investment in order to make them more resilient, sustainable and better prepare them for the challenges and opportunities of the green and digital transitions (European Commission, 2021). NextGenerationEU also includes €50.6 billion for the Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU); an initiative that continues and extends the crisis response and repair measures provided through the Coronavirus Response Investment Initiative and the Coronavirus Response Investment Initiative Plus, while contributing to a green, digital and resilient recovery (European Commission, 2021). Finally, NextGenerationEU brings supplementary capital to other European programs or funds such as Horizon2020, InvestEU, rural development or the Just Transition Fund (JTF) (which is part of the Just Transition Mechanism - JTM) (European Commission, 2021).

The aforementioned financial instruments will be crucial in achieving the goals set by the European Green Deal; a set of policy initiatives by the European Commission with the aim, inter alia, to reach net-zero greenhouse gas emissions by 2050, promote circular economy and improve energy efficiency in the building and transportation sector (European Commission, 2021). At least €1 trillion has been pledged to be mobilized by the European Green Deal Investment Plan (EGDIP) in sustainable investments over the next decade (European Commission, 2021).

The EGDIP consists of two main funding sources. The MFF and the EU ETS will provide more than half of the budget, €528 billion (€503 billion and €25 billion respectively). The rest will be sourced from the InvestEU, which will pool €279 billion from the public and commercial sectors, as well as €114 billion from national co-financing, until 2030 (European Commission, 2020a). The European Innovation Council has also set aside a budget of €300 million to invest in market-related innovations that support the objectives of the EU Green Deal (Lapierre, McDougall, 2021).

As the European Union moves toward climate neutrality, it became evident that not all its Member States or regions have the same starting point, due to disparities regarding their development potential. The EU regions most at risk of socio-economic disruption from this drastic process of reducing pollutant emissions are those where jobs depend on the extraction and production of fossil fuels, especially coal. In January 2020, the European Commission proposed the Just

Transition Mechanism, which is a part of the EGDIP, to help regions whose economies are most dependent on fossil fuels in order to cope with the socio-economic consequences of the transition to a sustainable economy. EU Member States have to identify the regions that are eligible, focusing on those that should phase-out the production and use of coal, lignite, peat and oil shale or transform GHG-intensive industrial processes without using natural gas as a “transition fuel” (Lypiridi, 2021).

The JTM consists of three pillars; the Just Transition Fund (JTF), a dedicated just transition scheme under InvestEU and a public sector loan facility with the European Investment Bank (EIB) Group backed by the MFF (European Commission, 2020b). In accordance with Regulation 2020/0006 (COD) of the European Parliament and of the Council of the EU establishing the Just Transition Fund, the JTF will be used to provide grants, the InvestEU scheme will attract private investment and the partnership with the EIB will leverage public funding.

The JTF will focus on the economic diversification of the territories most affected by the climate transition, the acquisition of new skills of the workforce and the active inclusion of workers and jobseekers in these territories. The JTF has a budget of €17.5 billion in public spending (€7.5 billion from the MFF and €10 billion from the NextGenerationEU in 2018 prices). Funding will be available to all Member States, while focusing on regions with the greatest transition challenges. JTF funds will be complemented by additional resources under the European Regional Development Fund (ERDF) and the European Social Fund Plus (ESF+) through a transfer mechanism (European Commission, 2020b). Finally, Member States will provide national resources in addition to the EU funds while the level of EU funding will be determined according to the category of the region in which the identified territories are located (European Commission, 2020b).

The dedicated transition scheme under InvestEU will provide a further €1.8 billion (in 2018 prices), supporting a wider range of private investments, including investments in energy and transport infrastructure, digitalization and digital connectivity, as well as in the circular economy (European Commission, 2020b). Moreover, the public sector loan facility from the EIB Group will combine a grant of €1.5 billion in public expenditure from the MFF and a loan of up to €10 billion from the EIB, who is expected to mobilize €25-30 billion of public investments in energy and transport infrastructure, district heating networks, energy efficiency measures; including buildings renovation and social infrastructure (COM/2020/22 final).

Particularly, the activities financed by the JTF will include micro-enterprises, sustainable tourism, social infrastructure, universities and public research centers, energy storage technologies, low-emission district heating, smart and sustainable transport, digital innovation (including digital and precision farming), actions to combat energy poverty; as well as culture, education and community building (COM/2020/22 final). The funding will take place through the establishment of an operational program with a specific management structure. A prerequisite for the start of the whole process is the preparation and implementation of the Territorial Plans on the basis of which the spatial picture of the economic interventions and activities in the affected areas will be depicted (COM/2020/22 final).

Lignite phase-out in Greece: the challenge of the green and just transition

Currently in Greece there are five municipalities who have based their economic activity on energy conversion by lignite. They are the municipalities of Eordea and Kozani in the regional unit of Kozani, the municipalities of Amyntaio and Florina in the regional unit of Florina, and the municipality of Megalopolis in Arcadia. It is crucial for effective development planning to combine strategic actions with funding programmes for achieving just transition, not only in order to successfully manage the socioeconomic consequences of lignite phase-out, but also to demonstrate that energy conversion technologies that emit smaller amounts of GHG (such as RES technologies) are compatible with economic growth (SDAM Steering Committee, 2020). The investment in electricity conversion using domestic lignite was an important step in the electrification of Greece and in the development of areas with significant reserves of this energy resource, thus creating significant externalities (such as Kozani, Florina and Megalopoli) (SDAM Steering Committee, 2020). However, the need to comply with EU's commitments under the Paris Agreement concerning the reach of zero GHG emissions by 2050 leads to a gradual cessation of this activity, with major socioeconomic consequences in the respective areas. In this context, a comprehensive Just Development Transition Plan (supported mainly by the aforementioned JTM) has been conceived for the developmental transformation of these regions, in order to offset the economic impact and secure jobs in the affected areas (SDAM Steering Committee, 2020). The socioeconomic just transition of the affected areas -due to their overall dependence on lignite-presupposes the restructuring of their production model in different sectors (SDAM Steering Committee, 2020). This is a complex set of actions to be planned and carried out at national, regional and local level, in the light of a strategic plan that activates fiscal instruments able to contribute to the achievement of the just transition objective (SDAM Steering Committee, 2020).

The Act of the Council of Ministers 52/23-12-2019 (Government Gazette 213/A/24-12-2019) identified the “Just Transition Development Plan of lignite areas” (SDAM) and established the formation and operation of a Government Committee for the Fair Development Transition of the Region of Western Macedonia and the Municipality of Megalopolis. In this project, the Government Committee has as its main responsibility the approval and monitoring of the implementation of the Fair Development Transition Plan. Furthermore, a SDAM Steering Committee has officially taken up its duties since March 2020 and it has been set up as a Working Group in order to coordinate the activities required for the preparation and implementation of SDAM (SDAM Steering Committee, 2020).

SDAM is divided into two parts based on the sources of funding: the national and the co-financed by the EU. For the co-financed part, a political agreement has been reached with the EU institutions on the terms and conditions that will apply during the 2021-2027 period, especially on the operation of JTM, such as the preparation of Territorial Just Transition Plans for each carbon-dependent region (SDAM Steering Committee, 2020). The consultation with the European Commission is at an advanced level and the relative Plans are expected to be approved under the conditions that they adequately describe, inter alia, each Member State's commitment to the green transition process in accordance with their “National Energy and Climate Plan” (NECP) (SDAM Steering Committee, 2020). The adoption of Territorial Plans will allow investments in the targeted territories to be supported by all three pillars of the JTM: the Just Transition Fund, the transition scheme under InvestEU and the public sector loan facility by the EIB Group (SDAM Steering Committee, 2020).

Given that the main source of funding of SDAM is the JTM, the National Strategic Reference Framework (NSRF) for the 2021-2027 period and the new Recovery Fund, SDAM will be regularly updated by the Steering Committee, following the progress of the NSRF planning and the new distinct Just Transition Development Program 2021-2027 in which the three Territorial Just Transition Plans are to be incorporated: two for the Greek lignite regions (Kozani-Florina and Megalopoli) as well as one for Crete and the North and South Aegean Islands (SDAM Steering Committee, 2020).

In February 2020, the Hellenic Ministry of Environment and Energy presented a plan for the smooth and fair transition to the post-lignite era for Western Macedonia and Megalopoli. As far as “clean” energy measures are concerned, emphasis is placed on the construction of photovoltaic parks ~2GW in Western Macedonia (SDAM Steering Committee, 2020). This installation is expected to contribute to the replacement of lignite power and the transition to “green” energy,

in accordance with the objectives of the NECP (ESEK, Government Gazette B '4893 / 31-12-2019). At the same time, another objective of this investment, in addition to the inflow of capital and the restart of the local economy, is to attract “green” investments; namely encouraging research and development of hydrogen units that will be connected to RES grids. Furthermore, an agreement has been achieved between Hellenic Petroleum S.A. and the German company Juwi for the construction of a 204MW photovoltaic park in Kozani (Hellenic Petroleum S.A., 2020).

The lack of thermal load adequacy for the smooth operation of district heating was recognized by the Steering Committee as one of the main issues that should be addressed to ensure a just transition. In this context, with the organized cooperation of all stakeholders at national, regional and local level, a viable and implementable plan has been drawn up in order to meet the heating needs of the residents in the cities of Kozani, Ptolemaida, Amyntaio, Florina and Megalopolis, with total investments to be implemented exceeding €170 million (SDAM Steering Committee, 2020). Finally, concerning the socioeconomic impacts of lignite phase-out, special measures have been laid down for supporting not only affected enterprises established in the transition areas but also affected individuals (SDAM Steering Committee, 2020).

By 2028, all existing lignite-fired power plants are expected to end all operations in Greece. This commitment, part of the need to achieve the pan-European goal of “climate neutrality” by 2050, will, inevitably, have significant consequences. Greek energy deficit is expected to exacerbate, a significant number of jobs are likely to be lost and entire regions, which until now have been dependent on the economic activity of PPC factories and mines, are about to face serious economic problems (Dousi, Mantzaris, Theodosiou & Christopoulou 2020). However, the current energy crisis (with the soaring fuel prices and the resulting increases in a plethora of consumer products) puts the undertaken ambitious decarbonization time targets in a new perspective.

Regarding Greece’s lignite phase-out plan, the rapid implementation of its demanding commitments entails drastic changes not only in the production of goods and the provision of services, but also in the economy of local communities, which have been dependent on lignite for decades. Western Macedonia and Arcadia are two territories that have played a leading role in Greece’s electricity supply for many years and which are expected to be mostly affected by these developments. Both face serious socioeconomic challenges, such as a lack of employment opportunities and the absence of alternative economic activities for the absorption of the workforce following the shutting-down of lignite-fired power plants (Dousi, 2020).

The transition from carbon-intensive to carbon-neutral technologies presupposes a large-scale transformation with new investments and specialized human resources that will undertake their implementation. While the said transition has not been completed, the Greek economy still has to produce low GHG emissions, otherwise it needs to obtain more emission allowances. As a result, transport and production prices are on the rise, and combined with increased demand that arose after the pandemic, they have a particular effect on energy bills and on retail tariffs for other products and services. Since “green” technologies are not cost-effective yet in order to be widely implemented and with the current upward trend on energy prices (causing inflation and fall in the purchasing power of consumers), it seems only logical that lignite phase-out time targets should be aligned with the current economic situation in Greece.

There will likely be a need to draw up and implement more realistic timetables which will enable the domestic construction potential to regroup and contribute to the new “green” investments, thus avoiding a rapid deterioration of the trade and energy balance that would be caused by the massive imports of RES. The implementation of JTM assists in overcoming the problem of mass financing RES technologies due to the funds allocated for their purchase and installation. Nevertheless, it does not answer the problem of participation of Greek companies in their construction and installation nor to the ways in which the national fuel, lignite, could be exploited. Therefore, Greece's balance of payments seems to be in danger of further deficit due to the fast pace “green” transition (Christodoylakis, 2021). Furthermore, it is doubtful whether “green” investments will be able to replace lignite as the new and efficient electricity providers in such a short notice, taking also into account their average short period of life. Consequently, it would be preferable for the decarbonisation targets to be reviewed in order for the green and just transition to be done comprehensively and with national participation. According to Orfanoudakis, extending Greece’s “green” transition deadline would be entirely appropriate in order to achieve the long-term goal of climate neutrality by 2050. Poland (which got the lion's share of JTM funding), Czech Republic, Bulgaria, Romania, Slovenia, Croatia and Germany are determined to keep their lignite-fired power plants up and running until 2050. It would be in the country’s best economic interests to operate the units that have not been depreciated yet; such as Agios Dimitrios Thermal Power Plant (TPP) 5, Megalopoli TPP 4, Florina TPP and Ptolemais TPP 5, since an immediate and abrupt shut-down is estimated to cost increase (Orfanoudakis, 2021).

It is also worth considering operating the potentially commercially exploitable oil and gas deposits in various parts of Greek territory and maritime Exclusive Economic Zones (EEZ), in order to strengthen Greece’s energy autonomy and minimize its energy deficit and energy dependency from

LNG and natural gas imports. A cooperation between Hellenic Petroleum S.A. and major oil companies, that have the proper expertise and financial capacity, could contribute, according to an estimate by Foskolos, to the Greek State at least \$20 billion per year from energy fuel exports over 50 years, upgrading exponentially its geopolitical position (Foskolos, 2021). Finally, it could be argued that nuclear energy could contribute to the objective of a zero-emission economy. Being regarded as a “clean” source of energy (as nuclear power plants do not directly release carbon dioxide), ten EU Member States, led by France, have asked the European Commission to recognize nuclear power as a low-carbon energy source that should be part of the EU’s ambitious transition policy to climate neutrality (Euronews, 2021). Taking advantage of the continuing energy crisis in Europe, nuclear energy is advocated as an affordable, stable and independent energy source that can protect European consumers from price fluctuations (Euronews, 2021). Unlike RES, nuclear energy is a constant and reliable energy source as it does not depend on weather conditions. As a result, in times of high demand, nuclear power plants are able to fully meet the needs of a country’s electrical grid, at all times. Greece should look further into it as nuclear energy could dramatically reduce electricity costs for businesses and households, while contributing to the country’s green transition and reducing its energy dependency on third countries.

Conclusions

Greece is called upon to continue the difficult task of just and green transition of the lignite-dependent regions during an energy crisis that directly affects economic growth and does not create a favorable environment for the expanded use of “green” technologies that are not cost-effective yet. A just transition is necessary for the lignite phase-out process, but also a key condition for its successful implementation. The effectiveness of the transition process depends on the specific conditions prevailing in each region, the initial degree of dependence of the local economy on lignite and hard coal extraction as well as combustion activities, the adaptability of businesses, the workforce and the local community. Each case should therefore be dealt with separately through a transition plan that takes into account the specific characteristics and conditions of each territory. However, the green and just transition is a long process, which requires first and foremost strategic planning and a policy framework with clear implementation objectives and timetables. So far, it seems that unilateral dependence on intermittent RES is not enough not only for the stability of a country’s electrical grid but also in order to resolve issues such as combating energy poverty, minimizing the state’s energy deficit and maximizing its energy autonomy. Therefore, it would make sense to prioritize the strengthening of Greece’s energy security (especially in the face of the current and possible future energy crises), taking into consideration the aforementioned options.

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