ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΙΡΑΙΩΣ

ΣΧΟΛΗ ΟΙΚΟΝΟΜΙΚΩΝ, ΕΠΙΧΕΙΡΗΜΑΤΙΚΩΝ ΚΑΙ ΔΙΕΘΝΩΝ ΣΠΟΥΔΩΝ

ΤΜΗΜΑ ΔΙΕΘΝΩΝ ΚΑΙ ΕΥΡΩΠΑΪΚΩΝ ΣΠΟΥΔΩΝ

ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ «ΕΝΕΡΓΕΙΑ:ΣΤΡΑΤΗΓΙΚΗ, ΔΙΚΑΙΟ & ΟΙΚΟΝΟΜΙΑ»

ΔΙΠΛΩΜΑΤΙΚΗ ΕΡΓΑΣΙΑ

"European Energy Security: Greece, Cyprus, Israel"

Σπυριδούλα Χυτήρη

ΑΜ: ΜΕΔ 15044

Επιβλέπων καθηγητής: Καθηγητής Αριστοτέλης Τζιαμπίρης

ΑΘΗΝΑ, ΔΕΚΕΜΒΡΙΟΣ 2017

Η Σπυριδούλα Χυτήρη βεβαιώνω ότι το έργο που εκπονήθηκε και παρουσιάζεται στην υποβαλλόμενη διπλωματική εργασία είναι αποκλειστικά ατομικό δικό μου. Όποιες πληροφορίες και υλικό που περιέχονται έχουν αντληθεί από άλλες πηγές, έχουν καταλλήλως αναφερθεί στην παρούσα διπλωματική εργασία. Επιπλέον τελώ εν γνώσει ότι σε περίπτωση διαπίστωσης ότι δεν συντρέχουν όσα βεβαιώνονται από μέρους μου, μου αφαιρείται ανά πάσα στιγμή αμέσως ο τίτλος.

AKNOWLEDGMENTS

I would like to express my special thanks to my supervisor Professor Aristotle Tziampiris for his valuable guidance during the conduction of the present study, his crucial feedback and his prompt responses to my requests. I would also like to thank Associate Professor Petros Liacouras and Assistant Professor Foteini Asderaki for accepting to participate in my Supervisory Committee. Many thanks should also be addressed to the teaching staff of the Postgraduate Studies Program in Energy: Strategy, Law &Economics for supplying me with profound knowledge to conceive the multidimensional field of energy studies and with the necessary tools to conduct my study and write my dissertation. I am further grateful to the Program for awarding me with an excellence scholarship during my studies. Additionally, I would like to express my gratitude to my family for their generous and unwavering support over the years of my studies and finally to thank my friends for their patience until the completion of the Program.

CONTENTS

List of figures

List of tables

INTRODUCTION

Since 2010 when significant natural gas reserves were discovered in Cyprus and Israel Eastern Mediterranean has been in the spotlight of energy discussions both globally and in the context of the European Union. The European Union does not have sufficient domestic resources to satisfy its energy needs and the available resources grow declining. In fact, the European Union suffers from external dependency with regards to energy resources and in particularly it is heavily dependent on a few suppliers for oil and natural gas resources. Russia, Norway and Algeria are the main suppliers of the EU. Russia is the biggest supplier of the EU and in reality some Member States are exclusively dependent on Russia for natural gas supplies. The EU has suffered from the Russo-Ukrainian dispute which resulted in natural gas disruptions. Therefore, one of the strategic goals of the European Union in the energy field is diversification; diversification of suppliers, routes and energy mix.

Eastern Mediterranean has been suggested that it can contribute to the diversification goal of the European Union thanks to its natural gas reserves. Cyprus and especially Israel have large reserves of natural gas which apart from the domestic energy markets can feed other markets as well. In truth, the biggest part of Cypriot will be exported, whereas a significant amount of Israel gas will be headed outside Israel. Part of the exports can be channeled to the European Union via Cyprus and Greece, which both are Member States of the European Union. Greece, Cyprus and Israel have been lately entangled in a multifaceted cooperation in which energy cooperation has attracted significant attention.

This study aims at examining how and to what extent the energy cooperation among Greece, Cyprus and Israel can contribute to the energy security of the European Union. Therefore, henceforward the adjective European whenever mentioned will refer to the European Union. The plan of the study is as follows.

The first chapter represents the theoretical framework of the study. The concept of energy security is examined so its components be specified. Starting from the World War I when energy security emerged as a topic of national importance the first chapter examines the evolution of the energy security meaning over the time to conclude that modern energy security is a multidimensional concept which demands a holistic and integrated approach in order to be comprehended and in which availability, affordability, accessibility and acceptability are salient features.

The second chapter focusing on import dependency presents the energy security of the European Union and it especially zooms in the European Energy Security Strategy and its natural gas strategy. This chapter also presents the importance of Eastern Mediterranean resources to the Union's energy security placing in the right framework. How Eastern Mediterranean can contribute to the European Union's security is also discussed.

The third chapter looks closely at the development of the energy triangle among Greece, Cyprus and Israel whose relations have been antagonistic and characterized by mutual suspicion until mid-2000s when the first steps of rapprochement and cooperation started taking place. First, the historical relations of Greece and Israel and Cyprus and Israel are presented and then the development of their energy cooperation. Lastly, the possible export routes of the Israeli and Cypriot natural gas are presented and assessed.

Finally, the study points out that Israel and Cyprus as exporting countries and Greece as transit country can enhance European Union's energy security, although they cannot be a game changer with the present discoveries. It is suggested that since Eastern Mediterranean is a turbulent region with bilateral conflicts between states and with international conflicts affecting the region the exploitation of natural gas reserves cannot materialize without geopolitical factors being taken into consideration. Along with technical and economic criteria the geopolitical situation should be taken into account for assessing the possible export routes. The study finds out that the optimal export route should be through the existing LNG plants of Egypt where that the low economic cost can counterbalance security concerns of this option. Finally, an alternative option is also

suggested, that is the East Med given that it involves two Member States of the European Union, which are the most stable in the region, and Israel which is the most prosperous state in the region.

Chapter I

The Concept of Energy Security

Energy security emerged as an issue of national importance on the eve of World War I when Winston Churchill, then First Lord of the Admiralty of the British Empire, decided to swift the energy source of the British navy from coal to oil. From the very beginning of his appointment in the Admiralty Churchill started preparing the British navy for the "battle of Armageddon'' with Germany which, he believed, was inevitable. The state of British naval ships did not allow at the time to surpass 25 knots, which would give them superiority in battle. Therefore, Churchill took a presumptuous decision, to swift from coal to oil. Oil enabled ships to move faster and be less visible as oil produces less steam. They could also remain in the sea longer and operate with less crew. However, oil was flammable meaning that ships and oil storage tanks were more vulnerable to attacks. Churchill's decision was controversial given that Great Britain was producing coal and not oil. The consequence of this decision was that Britain had to seek for oil in insecure areas since it could not rely anymore on its domestic coal resources[1]. Winston Churchill managed to convince both the Parliaments and the Royal Navy and in 1914, one month before the start of the World War I he secured for the Crown the control of 51% of the Anglo-Persian Oil Company[2]. Since then energy security has been treated as an issue of paramount importance and has been linked with national security. Energy security had originally been a synonym for security of fuels supply for the military[3], but contemporary meaning of energy security has been expanded to enshrine not only more fuels such as natural gas but also knowledge from several disciplines. Before exploring the modern

[1] Yergin, D., 'Ensuring energy security' *Foreign Affairs,* vol. 85, no. 2, 2006, p. 69

[2] McCain, J., 'Extraordinary foresight made Winston Churchill great', *Telegraph,* 20 March 2008. Available from: http://www.telegraph.co.uk/culture/books/3671962/John-McCain-Extraordinary-foresight-made-Winston-Churchill-great.html (accessed 17/11/2017)

[3] Cherp, A. & Jewell, J., 'The three perspectives on energy security: intellectual history, disciplinary roots and the potential for integration' *Current Opinion in Environmental Sustainability,* vol. 3, no. 4, 2011, p. 202

concept of energy security it would be useful to examine how energy security studies have evolved.

1.1 Energy security studies in the past

Aleh Cherp and Jessica Well identify three perspectives on energy security which draw from different scientific fields[4]. The first one originates from political science and especially from international relations, security studies, public policy and global governance. In more than the first three quarters of the 20th century energy security studies focused on the supply of fuels, mainly oil. The central concern of this perspective is who and through which mechanisms controls energy resources and this is the reason for which the two authors described it as the sovereignty perspective[5].

There are two main schools of thought in this perspective the old geopolitical school and the modern institutional school. The economic growth that took place in the Western World after the Word War II made oil supplies vital not only for the army but also for the economy of developed countries, which were dependent on oil for transport, heating and cooling and even more uses. On top of that, oil exporter countries were not any more colonies of western powers but rather independent and sovereign states, a development that added another risk to security of supply. Thus according to the geopolitical school what is important is control over energy resources and power balances.

On the other hand, the modern school put emphasis on the institutional aspect of energy security. Energy security can be threatened because of intentional acts of external actors, such as terrorist attacks or embargoes. The oil crises in the 1970s made clear that an international energy regime was of crucial importance. Therefore, energy stakeholders being concerned with control over energy resources pursued the establishment of international organizations and regimes which could avert disruption of oil supplies to

[4] Cherp, A. & Jewell, J. (n.3)
[5] Ibid, p. 206

consumer countries. The first result of this effort was the establishment of the International Energy Agency which was founded in 1974[6].

After the increase in oil prices due to the oil crises energy prices balanced reducing the importance of energy as a shaping factor of national power and security. Therefore, there had been a stagnation in energy security studies from a perspective of political science and international relations[7]. Another important consequence of the oil crises was the expansion of energy security concerns beyond oil to gas and other conventional energy resources, which presently has expanded even more to include renewable energy resources as well as other aspects of energy security. Many countries sought to be secured against another oil crisis by diversifying their resources and by improving their efficiency and energy systems. As a consequence energy systems became more complex and vulnerable and knowledge from engineering and natural sciences was also introduced to the analysis of energy issues in the last decades of the 20th century.

This gave rise to the second perspective, which Cherp and Jewell call the robustness perspective. Accordingly, the robustness perspective[8] takes into account the discourse of limited resources and the idea of vulnerability of complex technical energy systems. The idea of limited resources, which is fully expressed in the 'peak oil theory' [9], stresses the concerns that energy resources will not be sufficient to meet energy needs across the world in the future given the significant increase in energy demand. In addition, technical vulnerability pinpoints the danger of disruption in aged infrastructure, outages, natural disasters etc. The Chernobyl and Fukushima accidents are typical examples that justify this trend of thought. Through the prism of this perspective threats and damages to

[6] For a more detailed description of the principal issues in the thinking on energy security in this period see Biresselioglu, M. E., *European Energy Security. Turkey's future role and impact*, Palgrave Macmillan, 2011, pp. 11-13

[7] Biresselioglu, M. E. (n.6), pp. 13-14

[8] Cherp, A. & Jewell, J. (n.3), p. 206

[9] The peak oil theory was propounded by M.K. Hubbert in the 1950's to describe the production pattern of crude oil and its peak time in a given area. The United States served as the case study. For a current view on the peak oil debate see Graefe, L. 'The peak oil debate', *Economic Review Federal Reserve Bank of Atlanta,* vol. 94, 2009

energy systems are not intentional as a result of (geo)political reasons but rather objective due to natural disasters or technical vulnerabilities. Therefore, the question is 'how vulnerable is the energy system'?[10] The answer to a vulnerable energy system is improvement of infrastructure, energy efficiency, safer technologies etc.

The third perspective[11], the 'resilience' one, appeared in the 1980s and 1990s, when economic liberalization took place, and arguments from economics and complex system analysis where brought to the table. It contends that market rules could prove more efficient in securing energy flows. Regarding energy as a commodity 'depoliticizes' energy supply, since the participation of more actors in the market will limit politically motivated disruptions in the energy market. Market rules can clear energy price and attract investments in energy infrastructure enhancing that way the security of energy supply. Therefore, economic concepts such as affordability of energy prices became relevant in analyzing energy security giving birth to one of the many definitions of energy security reading as the 'availability of sufficient supplies at affordable prices'[12]. Moreover, the resilience perspective recognizes that unpredictable events can threaten energy security and hence the need to mitigate risks becomes imperative. The key concept to mitigating risks is diversity not only of resources but also of technologies, infrastructure, trade and of anything included in the energy trade chain.

Overall, all the three perspectives seek to guarantee energy security. What they differ in are the threats -their source and nature- against energy security and the response to them. As Cherp and Jewell explain that threats are intentional and come from political or market actors in the sovereignty perspective and therefore the establishment of an energy regime can guarantee energy security. In the robustness perspective, however, threats are objective and are rooted either in natural causes (i.e. depletion of energy resources) or technical ones (i.e. obsolete infrastructure and technologies) and solution lies in safer technologies, renewed infrastructure and alternative and more abundant

[10] Cherp, A. & Jewell, J. (n.3), p. 205
[11] Ibid, p. 205-206
[12] Yergin, D. (n.1), pp. 70-71

energy resources. The third perspective, the resilience one, considers threats unpredictable and for this reason the key answer to the energy security problem is mitigating risk. In fact, if precise answers were to be adopted there would be an overlap between the proposed answers by the three perspectives. For instance, new and safer infrastructures are proposed as solution by both the robustness and resilience perspectives, whereas diversity both of supplies and routes is a solution offered by the sovereignty and resilience perspectives[13]. As follows energy security is a policy problem that needs to be studied in a holistic approach embracing notions from a variety of all the above scientific fields especially nowadays that energy systems have grown so complex.

1.2 Modern energy security studies

Contemporary energy security studies have perceived the need for a more integrated approach to the topic; not only do they embrace more components of the energy system but also energy security is intertwined with other policy issues such as climate change. Contemporary energy security literature is following a comprehensive approach to the issue borrowing knowledge from several scientific paths. Modern energy studies are divided into qualitative and quantitative researches. Qualitative researches (the classification group) gather and succeedingly classify energy security concerns into aspects or dimensions of energy security, whereas the quantification group uses various numerical indexes or indicators to measure energy security performance[14]. While it would be plausible that qualitative and quantitative studies focus on different aspects of energy security, the study of Ang et al. pointed out that both group of studies cover the same range of energy themes to a great extent[15].

The scientific community has been rather prolific with regards to energy security and there have been proposed quite a few definitions of it, some of them being broad and

[13] Cherp, A. & Jewell, J. (n.3), pp. 207-208
[14] Cherp, A. & Jewell, J. (n.3), pp. 208-209
[15] Ang, B.W., Choong, W.L., Ng, T.S., 'Energy security: Definitions, dimensions and indexes', *Renewable and Sustainable Energy Reviews*, vol. 42, 2015, p. 1083

other narrow[16]. In the following paragraphs several approaches of energy security are presented and examined.

1.2.1. The four As

In 2007 the Asia Pacific Energy Research Centre (APERC) proposed the 4As of energy security (availability, accessibility, affordability and acceptability) as defining dimensions of energy security[17]. Since then the 4As have served as a basis for energy security literature. Quite a few authors have adhered to this trend of approaching energy security through dimensions and indicators, while other have criticized energy security as a 'slippery' and 'elusive' concept.

APERC defines energy security as "the ability of an economy to guarantee the availability of energy resource supply in a sustainable and timely manner with the energy price being at a level that will not adversely affect the economic performance of the economy"[18], identifying three key elements of energy security; physical energy security, economic energy security and environmental sustainability which are further split in four dimensions, namely availability, accessibility, affordability and acceptability[19].

Similarly, Ren and Sovacool endorsing the 4As define energy security as "equitably providing available, affordable, reliable, efficient, environmentally benign, proactively governed and socially acceptable energy services to end-users"[20]. Kruyt, Vuuren, de Vries

[16] For a list of energy security definitions see Winzer, Ch., 'Conceptualizing energy security', *Energy Policy*, vol. 46, 2012, pp. 42-43

[17] APERC, *A quest for energy security in the 21st century. Resources and constrains*, Asia Pacific Energy Research Centre, 2007

[18] APERC (n.17), p. 6

[19] ibid

[20] Ren, J. & Sovacool, B. K., 'Quantifying, measuring, and strategizing energy security: Determining the most meaningful dimensions and metrics', *Energy,* vol. 76, 2014, p.838

and Groenenberg even though they do not provide a definition of energy security, adhere to the 4As scheme[21].

Availability

The availability of energy resources refers to the physical/geological existence of energy resources a country has on its own and in case it lacks own resources to its ability to procure them from other countries. Thus, short-term and long-term reserves as well as the type of resources are elements of the availability. Diversification is a crucial concept for a country's energy security and for enhancing the availability of resources. Winston Churchill has implied that is his famous phrase 'safety and certainty in oil lie in variety and variety alone'[22]. However, nowadays diversification is not limited to sources diversity. It also comprises spatial diversity, energy mix diversity, technology diversity and transport route diversity[23]. A country with high source diversity is a country which has multiple energy import options apart from its indigenous resources. Spatial diversity refers to the land area of a country across which it can spread energy facilities and thus mitigate the effects of incidents, such as terrorism, on one location. A country can also increase the availability of energy by integrating more resources in its energy mix. Finally, technology diversity and transport route diversity can enhance energy availability by guaranteeing a country access to resources and for this reason will be examined in the accessibility dimension.

Accessibility

Accessibility describes the ability a country has to reach the available resources overcoming several barriers, that is to say geographical constraints, (geo)-political factors,

[21] Kruyt, B., Van Vuuren, D.P., De Vries, H.J.M., Groenenberg, H., 'Indicators for energy security', *Energy Policy*, vol. 37, 2009, pp. 2166-2181
[22] Yergin, D. (n.1), p. 69
[23] Ang, B.W., Choong, W.L., Ng, T.S. (n.15), p. 1081

technological challenges and economic barriers. It also refers to the resilience of the entire energy system.

Most of oil and gas reserves are located in specific geographical areas and countries and they are unevenly distributed. With regards to oil Middle East holds 47.3% of the total proved oil reserves at the end of 2015 with Saudi Arabia ranking first with 15.7% and Iran and Iraq following with 9.3% and 8.4% respectively. South and Central America is the second geographical area with the largest reserves with 19.4% in total. The vast majority of these reserves are located in Venezuela which holds 17.7% of proved reserves. Canada and Russia have also significant reserves with 10.1% and 6% correspondingly[24]. As for natural gas Middle East retains its first rank with 42.8% of total proved natural gas reserves at the end of 2015, while in total Europe and Eurasia there can be found 30.4% of them. The biggest quantity of natural gas reserves is embedded in Iran 18.2%, whereas Qatar has 13.1%. However, Russia is the second country in the world with the biggest natural gas reserves with 17.3%. Turkmenistan holds also a worth considering quantity, that is 9.4% of world reserves[25]. But what is more important is that producer-countries are hundreds of miles away from energy consumption centers and hence a security issue of transport of oil and gas from its extraction location to consumers arises.

Geographical constraints in combination with the lack of necessary technological means make some energy reserves, mainly oil reserves, impossible to be extracted. For instance, in the Arctic Ocean there are significant oil reserves but they are located in unattainable depths given the present technological means. Or non-conventional oil, such as oil sands in Canada, needs more effort to be processed and brought to exploitable state. On top of that, the development cost of such fields puts a barrier to the exploitation of the reserves found in these areas.

Similarly, with regards to natural gas reserves a significant amount of them is located far away from consumers-countries and the pipeline system has not yet been adequately

[24] *BP Statistical Review of World Energy*, June 2016, p. 6
[25] Ibid, p.20

developed to serve their energy needs. In the Asian Continent where China and India are the drivers of energy demand globally pipelines are not satisfactorily expanded. There are also small fields which are stranded away from markets for which the development cost renders their exploitation non-viable economically.

Furthermore, with regards to geographical constraints the delimitation of sea borders and in fact the lack of delimitation of sea borders, poses serious problems to the exploration and exploitation of energy sources. The case of Southeast Mediterranean where there are disputed sea borders among several countries is an indicative case.

Lastly, the political situation in a country might also hinder the exploitation of energy reserves. It is common knowledge that investors hesitate to invest their money in projects in countries where there is political instability and social upheavals.

Acceptability

As environmentalists and other scientists have risen their voice for protection of the environment and for a sustainable exploitation of energy resources, energy security has also been related with environmental and social concerns. Acceptability is pertinent to the environmental and social consequences of energy production and use. Sustainability of energy production is a key issue in this dimension. Energy poverty is another societal concern included in some energy security definitions.

Affordability

The element of affordability describes the economic cost of energy supplies, primarily for industries and households. It includes energy price and its stability, externalities and equity.

Slightly different are the dimensions that are proposed by Brown, Wang, Sovacool and D'Agostino for conceptualizing energy security[26]. They proclaim availability, affordability, efficiency and stewardship as the four defining criteria. Although Sovacool's participation in this article seems to be contradictory to the approach adopted in his article with Ren, a closer examination of the criteria employed shows that Bruyt et al. comprise the same aspects of energy security as the 4As. Besides, the definition of energy security they adopt is the same as proposed in Ren's and Sovacool's article as cited above (equitably providing available…energy services to end-users).

Affordability has the same meaning as in the 4As, namely 'providing energy services that are affordable for consumers and minimizing price volatility'. The same applies to environmental stewardship which covers concerns about protecting the natural environment, communities and future generations [27], that is to say the dimension of acceptability in the 4As.

Regarding availability in Brown's et al.'s it involves a) diversification both of 'the fuels used to provide energy services and of the location of facilities using those fuels, b) promotion of energy systems capable of recovering from attack or disruption and c) minimization of price volatility[28]. Therefore, in comparison to the 4As it comprises elements of the availability, accessibility and affordability dimensions of 4As. Diversifying the fuels used to provide energy services relates immediately to the availability dimension of 4As as it refers to the ability a country has to procure energy both by exploiting its own resources and by importing energy from other countries. Nevertheless, 'diversifying the location of facilities using these fuels' does not only touch upon the availability dimension but also upon the accessibility. The availability of delivery infrastructures and the resilience of the energy system overall are included in the accessibility dimension in APERC's report.

[26] Brown, M.A, Wang, Y., Sovacool, B.K., D'Agostino, A.L., 'Forty years of energy security trends: A comparative assessment of 22 industrialized countries', *Energy Research & Social Science*, vol. 4, 2014, pp. 64-77

[27] Ibid, p. 65

[28] Brown et al. (n.26), p. 65

Finally, the minimization of price volatility is an aspect of the affordability dimension of 4As.

Last but not least, efficiency (energy and economic efficiency) refers to improving the performance of energy equipment and altering consumer attitudes to reduce energy price exposure and mitigate energy import dependency[29]. Nonetheless, in the opinion of the present author energy and economic efficiency borrow elements from the affordability, accessibility and availability dimensions. An improved energy equipment is an aspect of accessibility since obsolete infrastructure or patchy electricity and pipelines networks hinder consumers from accessing energy. Equivalently, reducing exposure of consumers to energy price is definitely related to the economic cost of energy supplies, namely affordability, whereas mitigation of energy import dependency is an indication of availability.

Overall, the dimensions proposed by Brown, Wang, Sovacool and D'Agostino for approaching energy security do not differentiate themselves substantially from the 4As. It is about a different classification of the same components of energy security.

The same critique applies to Sovacool's and Mukherjee's article 'Conceptualizing and measuring energy security: A synthesized approach', which had been written before the two abovementioned articles Sovacool coauthored. To start with, Sovacool and Mukherjee describe energy security as 'a complex goal involving questions about how to equitably provide available, affordable, reliable, efficient environmentally benign, properly governed and socially acceptable energy services'[30]. This definition is almost identical to the other one which was coined in his subsequent articles. The only difference is that the adverb "properly" is replaced by "proactively" and the addition of "to end-users" after energy services. Therefore, in terms of definition these three articles are consistent and they differ in specifying different energy security's dimensions.

[29] Brown et al. (n.26), p. 65

[30] Sovacool, B. K. and Mukherjee, I., 'Conceptualizing and measuring energy security: A synthesized approach', *Energy*, vol. 36, no. 8, 2011, pp. 5344

Sovacool and Mukherjee identify five dimensions of energy security: availability, affordability, technology development, environmental and social sustainability and regulation and governance[31]. Availability as in the 4As refers to security of supply and production, dependency, diversification and prudent reserve to production ratios. Likewise, as in the 4As affordability concerns the economic cost of producing energy, price stability and equitable access to energy services. The next three dimensions are different from APERC's classification, but in the present author's opinion they simply have different names as they encompass several aspects of availability, acceptability and accessibility.

Environmental and social sustainability along with some aspects of regulation and governance constitute the dimension of acceptability of 4As, whereas other aspects of regulation and governance correspond to accessibility and availability. The components of environmental and social sustainability are land use, water, climate change and air pollution. In particular, sustainability is linked with deforestation and land degradation, sufficient quantity and suitable quality of water, atmospheric and indoor pollution, CHG emissions associated with climate change and adaptation to climate change[32]. As it is obvious it refers to the environmental concerns of acceptability. Regulation and governance, on the other hand, enclose the social concerns of acceptability. Stable and transparent governance, knowledge of sound regulation and competition address the social concerns of energy security. Competition, trade and regional interconnectivity also cover aspects of availability and accessibility as open markets enhance security of supplies and interconnectivity enable end-users to reach energy more easily.

Finally, for Sovacool and Mukherjee the borders of the dimension of technology development are set by innovation and research, safety and reliability, resilience, energy efficiency and investment[33]. However, the 'capacity of a country to adapt and respond to the challenges from disruptions'[34] together with investments in researching and

[31] Sovacool, B.K & Mukherjee, I. (n. 30), pp.5343, 5345
[32] Ibid
[33] Ibid
[34] Ibid

developing new energy technologies and with investments in infrastructure accounts for the accessibility dimension of 4As. Accessible energy resources demand a resilient system, namely modern and safe energy infrastructure and new technological means which enable countries to reach energy resources located in places which have not been exploited yet. Modern technological means are also related to the availability dimension as they allow for the exploitation of more energy resources, be it renewables, conventional fossil fuels in unreachable areas or unconventional fossil fuels.

All in all, the substance of energy security as analyzed in Sovacool's and Mukherjee's article is the same with APERC's approach to the topic. The difference is tracked down on categorizing and naming the same components of energy security in a different way.

- *Interplay of energy security dimensions*

Whatever energy security aspects are called there is an interplay among them[35]. Energy security dimensions resemble communicating vessels as a change in one of them will have consequences on another one if not on all of them. Therefore, energy security dimensions should be examined in parallel for the sake of a study's scientific soundness. For instance enhancing availability can lead to a decrease in energy prices and further improve accessibility. Conversely, an improvement, for example, in pipelines technology will make more energy resources accessible ameliorating availability and provoking a fall in energy prices. Similarly, an improvement in energy technological means can boost acceptability as some energy exploitation methods can become more environmentally friendly. This interplay is also reflected in contemporary literature where other dimensions that availability have been gradually examined to bigger extent. In fact, as the research study of Ang et al showed even though in the contemporary energy security literature

[35] Ren and Sovacool have measured the interplay among energy resources using four variables: no influence, low influence, medium influence and high influence. For more see Ren, J. & Sovacool, B.K. (n. 20), pp. 842-844

availability has always been a preponderant dimension, other dimensions have grown important over time, such as environmental concerns, governance and efficiency[36].

- *Indicators of energy security*

Scholars in their painstaking effort to define and measure energy security have suggested several indicators, some of them being simple others aggregated, and metrics. Sovacool and Mukherjee have designated 320 simple indicators and 52 complex, which measure the components of energy security dimensions[37]. Kruyt et al. reviewed the literature of energy security and gathered the most commonly used aggregated and disaggregated indicators[38]. In the following paragraphs some widely used indicators and metrics, are presented.

A very important indicator for measuring energy security and especially availability is the resources estimates. Reserves to production ratios, which indicate the years of production left given the current production levels is also used for measuring availability as well as diversity indices, which measure diversity of fuels, suppliers and geographical sources. APERC in its study for energy security in the APEC region used the diversification of primary energy demand to calculate the security of energy supply within the region by modifying the Shannon Index, which is used for measuring biodiversity[39].

Dependency is of paramount importance for energy security and can measure both availability and affordability. Dependency refers to the amount of energy imports from foreign countries and can be further broken down in specific fuels indicators. For example, in their study Brown et al. identified oil import and gas import dependency as well as dependence on petroleum transport fuels[40]. APERC, on the other hand, used three indicators to calculate dependency, namely net energy import dependency, net oil import

[36] Ang, B.W. et al (n. 15), p. 1083
[37] Sovacool, B.K. & Mukherjee, I. (n. 30)
[38] Kruyt et al. (n. 21), pp. 2168-2171
[39] APERC (n. 17), pp. 43-44
[40] Brown et al. (n. 26), pp. 65-66

dependency and Middle East oil dependency. Finally, Ren and Sovacool defined dependency as the total imported energy divided by the population of a country and categorized it as an affordability indicator[41].

With regards to the affordability dimension energy price, be it electricity, petrol price or the price of any energy resource used in the country, is commonly used as an indicator. Price reflect scarcity and depletion of energy resources. What is important in energy price is its stability since the latter shows the resilience of energy system against market risks. Decentralization of market and market liquidity, which 'refers to the ability of energy resources to be sold without causing a significant movement in the price and with minimum loss of value'[42], are also of relevance. Regulatory mechanisms of energy activities and energy trade elements as volume of energy imports per pipeline, number of transnational natural gas pipelines, volume of natural gas/oil exports etc. are indicative of a country's energy security.

Political stability in supplier countries, even though it is difficult to be quantified, is used for measuring energy security and in particular the dimension of accessibility. Ren and Sovacool have suggested more qualitative indicators for measuring accessibility, namely imports stability, military power of a country, safety and reliability of the energy system as well as trade, which indicates the international politics and relations influencing energy trade[43].

Indicators have also been used for measuring the acceptability dimension. As environmental concerns are dominant in this aspect of energy security, there have been used several environment-related metrics such as the share of non-carbon fuels in a country's energy portfolio (Non-fuel based energy portfolio in APERC's terminology). The pollutant footprint of energy activities on the environment is measured as via numerous metrics such as annual number of oil spills, annual or per capita emissions of carbon monoxide, mercury etc. Energy intensity is also a factor taken into consideration as it is

[41] Ren, J. & Sovacool, B.K. (n. 20), p. 841
[42] Ibid
[43] Ibid, pp. 841-842

refers to efficiency. Nevertheless, efficiency metrics can also measure affordability, as an inefficient electricity generator for example may cause an increase in electricity price.

One cannot, however, claim that these indicators are absolutely clear-cut and useful for measuring only one dimension of energy security. Their enlistment shows simply where they focus on. For instance, efficiency indicators can indicate both the acceptability and affordability dimensions of energy security. In the same way, dependency indicators show whether there are available energy resources to a country but at the same time they determine affordability as imports bear a significant cost.

1.2.2 The 4Rs

Hughes has suggested the 4Rs methodology for explaining energy security[44]. The 4Rs stand for review, reduce, replace and restrict. Hughes suggests a methodology to individual and organizations to employ it in order to understand energy security's importance and implications, then improve it and finally develop energy policies.

The first R which reads for 'review' calls for the review of energy resources and infrastructure of a country or 'jurisdiction' as it mentioned by Hughes, and of energy services and energy intensities. The existing energy resources together with the energy supplies and the suppliers and the infrastructure should be tracked down and assessed both in a quantitative and a qualitative way. In particular, the cost of energy resources and of the necessary infrastructure to exploit these resources should be measured as well as qualitative components, such as political stability. The various secure energy supplies of the jurisdiction should be especially examined, to wit, their expected lifetime, the infrastructure necessary for their support and the cost a jurisdiction has to pay to benefit from these supplies. A jurisdiction should also analyze its energy services and energy intensities by sector and in fact each sector should be broken down to its components. Hughes concludes that infrastructure is absolutely necessary for consumers to enjoy

[44] Hughes, L., 'The four 'R's of energy security, *Energy Policy*, vol. 37, no. 6, 2009, pp. 2459-2461

energy services and that energy supplies should be cost at an affordable level, otherwise consumers cannot enjoy energy services no matter the available infrastructure[45]. The first R, 'review', echoes the availability and affordability dimensions of the 4As.

Energy reduction, the second 'R', comprises of two components, energy conservation and energy efficiency, and it aims at reducing the amount of energy a jurisdiction consumes. Energy conservation means reducing the functioning level of an energy service in order to consume less energy, whereas efficiency means using an energy service in the previous level but consuming less energy. However, Hughes admits that conservation and efficiency may have limited impact in improving energy security, for conservation is often short-lived and the results of efficiency in an energy activity might be counterbalanced if consumers use their energy saving in other more energy intense activities[46].

Replace, which is the third 'R', refers to replacing 'insecure energy supplies with secure ones by either diversifying energy supplies or changing infrastructure to allow alternative energy resources, or both'[47]. Replacement in Hughes's methodology is wider than diversification as it was conceived in Churchill's famous phrase 'safety and certainty in oil lie in variety and variety alone'[48]. Whereas diversification in Churchill's phrase means the multiplication of energy suppliers so as the impact of disruption from a supplier be mitigated by alternative procurers, replacement also subsumes replacing existing resources with new ones by changing or establishing new infrastructure appropriate for using alternative energy resources. Nevertheless, Hughes points out that replacement policies can only be temporal in their effect since supplies are not unlimited[49].

Finally, the fourth 'R' stands for 'restrict', restrict new demand to secure sources. In this case when a jurisdiction is in need of more energy should maximize the use of its secure energy sources rather than looking for new energy sources, whose secureness is doubtful.

[45] Hughes, L. (n. 44), p. 2459
[46]Ibid, p. 2460
[47] Ibid
[48] Yergin, D. (n. 1), p. 69
[49] Hughes, L. (n. 44), p. 2460

The four Rs, even though they might neighbor the 4As and despite they are suggested as a methodology to explain energy security[50], are not a conceptual framework for defining energy security. They are rather a proposed methodology for improving energy security. The four Rs do not address the core of energy security and they do not analyze the aspects of energy security or at least they do not go in depth. Instead, the 4Rs go a step further and propose a methodology a jurisdiction should follow in order to form its energy policy and to solve its energy security problem following four steps.

1.2.3 Other approaches

The aforementioned approaches of energy security adopt a wide angle to the topic, but there are also narrower definitions. Winzer suggests a narrow definition of energy security, that of energy supplies continuity, in order to limit overlap between energy security and other concepts such as sustainability and economic efficiency. Besides, he argues that energy security defined that way can be more precisely measured[51].

In Winzer's approach risks and threats are the key elements for understanding energy security. Johansson's adopts the same approach for explaining energy security[52]. Both writers, even though only Johansson states it explicitly, treat energy security as an object, meaning that it is threatened by external security threats and consequently that it should be protected in order to provide services which are necessary for the well-functioning of a country[53]. According to Winzer energy security should be examined though three prisms. The sources of risks that threaten continuity of energy supplies should be considered first. Risks are broken down into technical, human and natural ones. Technical risks are related to infrastructure, human risks include market speculation, demand risk, underinvestment, terrorism, sabotage, political and geopolitical risks and finally natural

[50] Hughes, L. (n. 44), p. 2459
[51] Winzer, Ch. (n. 16), p. 36
[52] Johansson, B., 'A broadened typology on energy and security' *Energy,* vol. 53 May, 2013, p. 201
[53] Johansson also analyzes energy security from the angle of subject, that is to say that energy security is a subject posing threats to human, national and societal security. For further information see Johansson B. (n. 52), pp.202-203

risks refer to natural disasters, resource depletion and resource intermittency. Without rejecting the dimensions of availability and accessibility Winzer contends that these dimensions are subcategories of sources of risk.

The other two prisms are the scope of the impact measure and the severity filters. The impact of the scope measure is a tool to measure how and to what extent risks influence energy supply chain. The impacts of risks are measured along four axes, continuity of the commodity supplies, continuity of service supplies, economic continuity of a country and human safety and environmental sustainability. These axes echo the 4AS as continuity of the commodity supplies cover availability and accessibility dimensions and economic continuity and impact on environment and society are linked with affordability and acceptability. Continuity of supplies corresponds to affordability and availability as it refers to price continuity and energy services availability. Winzer points out that the impact of a risk on one of the fours axes also influence other axes too but not only in a linear sequence. For instance, a discontinuity in commodity supply has repercussions on society and environment as well as a discontinuity in service supply.

Severity filters are the last dimension for conceptualizing energy security according to Winzer. Severity filters's usefulness is to 'distinguish between secure and insecure levels of continuity'. Without being exhaustive the list of severity filters includes speed, size, sustention, spread, decreasing singularity and sureness of the impacts. Speed (or prior warning time according to Johansson) refers to the time within which a threat can be materialized and size to the magnitude of changes in scarcity within the affected area. Related also to time but to the duration of a threat is the sustention of threat impacts (level of permanence in Johansson's words), while spread of threat impacts concerns the size of the geographical area that is affected by the threat each time. Lastly, singularity amounts to the frequency of threats appearance and sureness of threats describes their uncertainty[54].

[54] Each of the severity filters has different measurement levels. There are three speeds, constant scarcity, slow stresses and fast shocks as there are three levels of size, that is, impending changes, small changes and phase changes. Sustention of threats is divided to transitory, sustained and permanent impacts,

After analyzing energy security through the scope of risk Winzer suggests to draw a separating line between energy security and sustainability and economic efficiency. In his opinion and with regards to the scope of the impact measure, impacts of the energy supply chain on the environment and safety should be considered within the concept of sustainability. On the contrary threats that have an impact on the supply chain, which can be divided into commodity supply continuity, service supply continuity and the resulting continuity of the economy, should be considered within the energy security. Moreover, value judgments about the desirability of continuity level should be examined within the scope of economic efficiency. A distinction between energy security and economic efficiency should also be drawn along the axis of speed of threat impacts. Winzer argues that constant scarcity is an aspect of economic efficiency as any scarcity level changes in the long-run. On the other hand changes of scarcity levels is an aspect of energy security. However, Winzer recognizes that there are areas of overlap among the three concepts of energy security, economic efficiency and sustainability and safety because the same cause (a threat) can provoke results at different areas. Overall, drawing boundaries among the neighboring concepts he concludes that the common concept of all energy security definitions is 'the absence of, protection from or adaptability to threats that are caused by or have an impact on the energy supply chain', which is further divided in the commodity supply continuity, service supply continuity and continuity of the economy[55].

- *Temporal and spatial dimensions of energy security*

Before completing the examination of the concept of energy security its temporal and spatial dimensions should be also addressed. Energy security as a concept is not defined in a temporal or a spatial vacuum. On the contrary, its meaning differs according to time and countries.

whereas a threat can be spread to local, national or global level. Regarding singularity of threats they can be unique, rather infrequent and relatively frequent. There are four levels of sureness of threats, threats that can be predicted, that are probabilistic, heuristic or unknown.

[55] Winzer Ch. (n. 16), p. 41

Energy security should be distinguished between short-term and long-term because threats against vary over time. Short-term energy security is mainly concerned with disruption of supplies and its mitigation, while in the long-term the whole energy system is taken into consideration and adequacy of supply, infrastructure adequacy, investments level and technological advancement gather attention. Consequently, the meaning of energy security differs across time because 'the probability, likelihood and consequences of different risks or threats to supply will vary over time'[56].

Moreover, energy security comprises a different meaning for every country depending on the indigenous resources of the country, policy goals, technological development etc. But more importantly the aspects of energy security vary according to the 'eye of the beholder'. Producer and consumer-countries define energy security from their point of view. Consumer countries are concerned with security of supply, that is 'reliability and availability of energy at reasonable prices'[57], whereas producer countries, which are often heavily dependent on the income coming from their energy exports, are interested in securing demand for energy, namely sufficient access to markets and consumers. Producer countries need to secure steady sales of their oil and gas reserves as well as stable prices. It is obvious, therefore, that there is an interdependence between producer and consumer countries.

- *Energy security definitions: meanings of different things or aspects of the same thing?*

One reviewing the energy security literature could reasonably conclude that energy security represents many different concepts. In fact, quite a few authors have expressed their doubt whether energy security can be totally comprehended. Lynne Chester characterized energy security as an 'inherently slippery' concept because its meaning

[56] Chester, L. 'Conceptualizing energy security and making explicit its polysemic nature', *Energy Policy,* vol. 38, no. 2, 2010, p. 891

[57] Yergin, D., 'What does 'Energy Security' really mean?, *Wall Street Journal,* 11 July, 2006, p.A. 12

differs within time, within different stakeholders and energy markets[58]. Energy security is polysemic in its nature and the factors influencing it change all the time making thus impractical and futile to seek for a common definition[59]. Fischhendler and Nathan believe that energy security has a transposable nature[60], whereas Kruyt et al believe that is has a 'rather elusive' nature[61].

A reason for which authors have devised several definitions of energy security is the way they choose their analysis focus. For instance, Winzer explains that choosing different risks to energy security or impact measures results in different definitions[62]. Likewise, Cherp and Jewell explain that energy security means 'different things in different situation and to different people' because energy systems and energy policy priorities differ between countries[63]. Thus, concentrating on different aspects of energy security yields different outcomes. Abusing the usage of term energy security so as other policy goals be upgraded and given priority as issues of energy security, also results in different definitions, add Cherp and Jewell[64].

Although the aforementioned definitions of energy security seem to be different in meaning, this is not the case. Cherp and Jewell claim that they are different aspects of the one and the same concept that is energy security[65]. Baldwin with regards to security has argued that it is about one concept and that different dimensions of security such as economic, military, environmental etc. are all aspects of security. Multiple dimensions of security and their alteration over time do not indicate different concepts. They do indicate possible alterations in the specifications of these dimensions[66]. Logically, this applies to energy security. Its different contents according to time and country do not signify

[58] Chester, L. (n.56) p. 893
[59] ibid
[60] Fischhendler, I. & Nathan, D., 'In the name of energy security: the struggle over the exportation of Israeli natural gas', *Energy Policy,* vol. 70, 2014, p.152
[61] Kruyt, B. et al. (n. 20), p. 2166
[62] Winzer, C. (n. 15), p. 37
[63] Cherp, A. & Jewell, J., 'The concept of energy security: Beyond the four As', *Energy Policy,* vol. 75, 2014, p. 416
[64] ibid
[65] ibid
[66] Baldwin, D. A., 'The concept of security', *Review of International Studies*, vol. 23, 1997, p. 23

different concepts. They are simply different instances of energy security under different conditions. Besides, this is the reason why countries have different energy policies and goals among them and across time as Cher and Jewell point out[67].

1.3 Conclusion

After reviewing the literature on energy security definition the following conclusions can be drawn. Every researcher agree on the importance of energy security but not on its meaning. However, there are some features in several contemporary energy security definitions which are salient. Ang et al. researched 83 definitions in papers written from 2001 to 2014 to find out that availability is almost included in all the definitions (99%) and then come infrastructure (72%) and energy prices (71%). Environment and societal effects are included in about one third of the researched definitions, whereas governance and energy efficiency were considered in one fourth of the definitions[68]. Moreover, the concept of energy security has expanded from an oil and geopolitical perspective to a wide concept which embraces interdisciplinary aspects and demand a holistic approach for its conceptualization. Energy security is 'a synergistic concept that rests on multiple interconnected dimensions'[69] which are measured using a basket of multiple indicators, and it finds different expressions across countries and over time.

However, as Yergin explained, energy security 'does not reside in a realm of its own'[70]. It belongs to the grid of relations between countries and therefore there is an interaction between them. 'In a world of increasing interdependence', he argues, 'energy security will depend much on how countries manage their relations with one another, whether bilaterally or within multinational frameworks'[71]. But which comes first? Are good political relations between countries a prerequisite for energy security cooperation in

[67] Cherp, A. & Jewell, J. (n. 62), p. 416
[68] Ang, B.W. (n. 14), p. 1082
[69] Sovacool, B.K. & Mukherjee, I. (n. 29), p.5346
[70] Yergin, D. (n. 54)
[71] Yergin, D. (n.1), p. 82

energy issues or is energy security the drive for countries to develop bilateral relations or even reconcile? Do only economic and technical criteria define energy projects? These questions will be examined in the following chapters using as case studies Greece, Cyprus and Israel.

Chapter 2

Energy Security in the European Union

'Regardless of how the stand-off over Ukraine develops, one lesson is clear: excessive dependence on Russian energy makes Europe weak. And Russia does not sell its resources cheap- at least, not on everyone'[72].

'The seed of the EU was planted by a simple vision: common control over-and common stake in- steel production and coal mining. It is time to strengthen the community in the field of energy. Now that new technologies allow it, and old challenges demand it, we can hardly afford not to.[73]*'*

These two phrases of the article Donald Tusk had written in 2014 when he was Prime Minister of Poland, currently President of the European Council, boil down the basic weakness of the European Union's energy security and the main goal of the Union's energy policy. European Union is heavily dependent on Russia for energy supplies, especially of natural gas, while at the same time its indigenous resources are being depleted. Therefore, the Union decided to adopt policies and measures which will strengthen its energy security. Diversification of energy resources, suppliers and routes is an important pillar of this effort. As a result, the European Commission in an effort to underline the importance of energy for the Union and to promote energy policies effectively decided to establish an Energy Union and a vice-president of the Commission in charge of the Energy Union.

This chapter examines energy security in the European Union with a focus on import dependency and the contribution of the Eastern Mediterranean region to the Union's energy security.

[72] Tusk, D., 'A united Europe can end Russia's energy stranglehold', *Financial Times*, 21 April 2014. Available from: https://www.ft.com/content/91508464-c661-11e3-ba0e-00144feabdc0?mhq5j=e5 (accessed 15/10/2017)
[73] Tusk, D. (n. 72)

1.1 European Union's energy security in numbers

- *Energy production-energy mix*

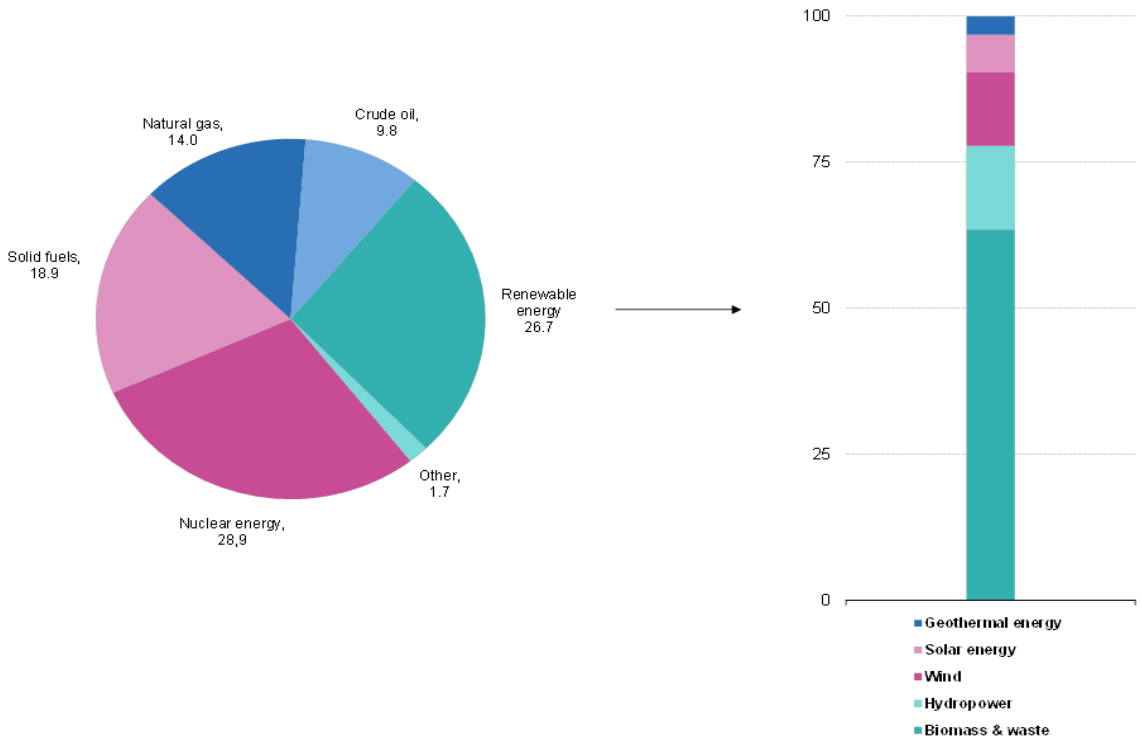
The energy production of the EU-28 in 2015 accounted for 5.6% of the world energy production[74]. In 2015 production of primary energy in EU-28 totaled 767 Mtoe, which was 0.8% lower than the previous year. Actually, EU's domestic energy resources have been dwindling over the past ten years and its primary energy productions has shrunk 15.2% since 2005[75]. This downward trajectory will continue until 2030 as all energy projection scenarios warn[76].

The energy mix of production in 2015 consisted of various resources, the biggest of which was nuclear energy with 28.9% of total. Renewable energy was the second biggest resource with 26.7%, whereas the share of solid fuels was significantly smaller (18.9%). Natural gas contributed by 14% in the primary energy production, whereas the contribution of crude oil was 9.8%[77].

Over the span of ten years, 2005-2015, the production from renewables was the only one that increased by 71% replacing to some degree production from other sources. Production from all other sources has been reduced especially from crude oil and natural gas which both fell by more than 43%[78].

[74] *EU Energy in figures. Statistical pocketbook 2017*, Luxembourg, Publications Officer of the European Union, 2016, p. 10
[75] Eurostat (a), *Energy production and imports* [website], June 2017. Available from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_production_and_imports (accessed 24/10/2017)
[76] European Commission, 'In-depth study of European Energy Strategy accompanying the document Communication from the Commission to the Council and the European Parliament: European Energy Security Strategy COM(2014) 330 final ' SWD(2014) 330 final/3 , pp. 93-97
[77] Eurostat (a) (n. 75)
[78] Eurostat (a) (n.75)

Fig.1 Production of primary energy, EU-28, 2015 (% of total)



Source: Eurostat (online data codes: nrg_100a and nrg_107a)

- *Energy consumption-energy mix*

The EU-28 gross inland consumption[79] in 2015 amounted to 11.6% of the total world gross inland energy consumption[80]. In 2015 it increased and reached 1627 Mtoe, almost at the same levels as it had been in 1990[81]. The share of EU-28 in the world final energy

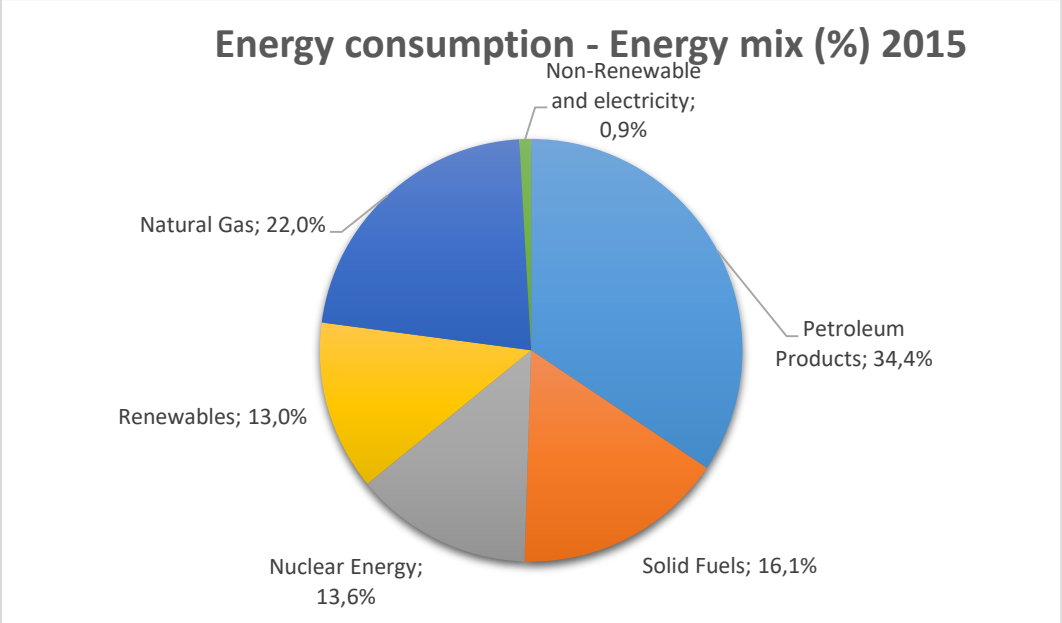
[79] According to Eurostat gross inland energy consumption is the total energy demand of a country or region. It covers: a)consumption by the energy sector itself, b) distribution and transformation losses, c) final energy consumption by end users and d) statistical differences not already captured on primary energy consumption and final energy consumption

[80] *EU Energy in figures. Statistical pocketbook 2017* (n.74), p.12

[81] Eurostat (b), *Consumption of Energy*, [website], June 2017. Available from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Consumption_of_energy (accessed 24/10/2017)

consumption[82] in 2015 was 11.9% which counted for 1114 Mtoe[83]. In the energy consumption mix petroleum products counted more than one third (34.4%) and natural gas more than one fifth (22%). Solid fuels were the third most used resource (16.1%) in energy consumption, whereas nuclear energy and renewables had almost the same share (13.6% and 13% respectively)[84].

Fig.2 Energy consumption-Energy mix (%) 2015



Source: Author's depiction of Eurostat figures

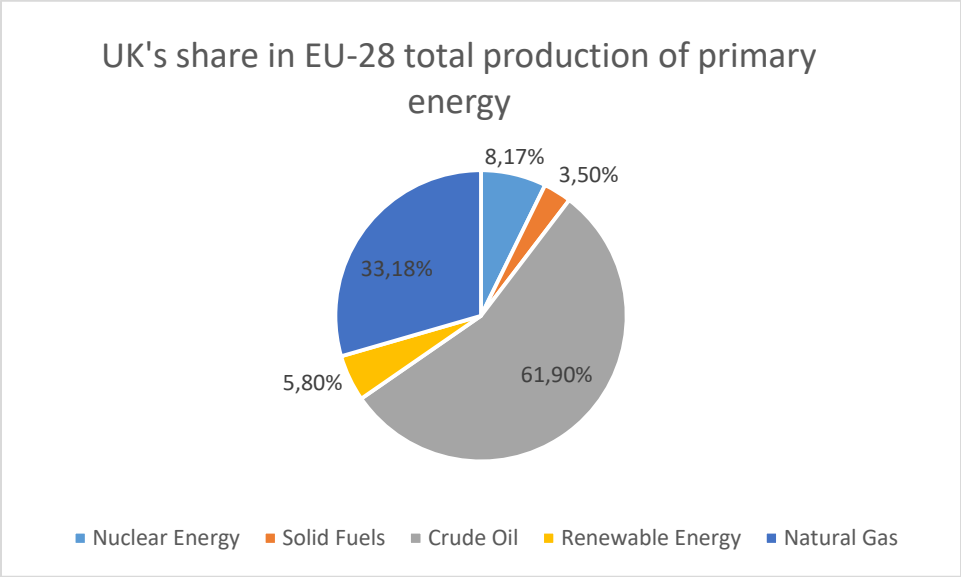
- *BREXIT's aspect on EU's energy security*

Nevertheless, for a better understanding of EU's energy production and energy security in general the impact of BREXIT on EU's energy security should be taken into account. The UK is the second-largest producer of natural gas in the European Union. In 2015 UK's

[82] Eurostat defines final energy consumption as the total energy consumed by end users, such as households, industry and agriculture. It is the energy that reaches the final consumer's door and excludes that which is used by the energy sector itself.
[83] *EU Energy in figures. Statistical pocketbook 2017* (n.74), p.14
[84] Eurostat (b) (n. 81)

production of natural gas amounted to 35.6 Mtoe, which was equal to 33.18% of EU-28's natural gas production[85]. UK's share in crude oil production of the EU-28 is almost as double as its natural gas share, 61.9%. UK's contribution in EU's production from nuclear, renewable energy and solid fuels is significantly smaller. UK's energy production corresponded to 15.4% of the EU-28's overall production in 2015 and its consumption to 11.7% of the Union's consumption[86].

Fig.3 UK's share in EU-28 total production of primary energy



Source: Author's elaboration of Eurostat figures

At a first glance it seems that BREXIT will influence negatively EU's energy production and therefore security given that reduction in energy consumption because of UK's share deduction does not counterweigh the loss in production. However, this is not the case. The electricity and gas trade between the UK and EU-27 is rather limited. The UK imports 7.5% of its electricity consumption from the EU, whereas the latter imports only 0.07% of

[85] Author's elaboration of Eurostat's (a) (n.75) figures
[86] Author's elaboration of Eurostat's (a) (n.75) and (b) (n.81) figures

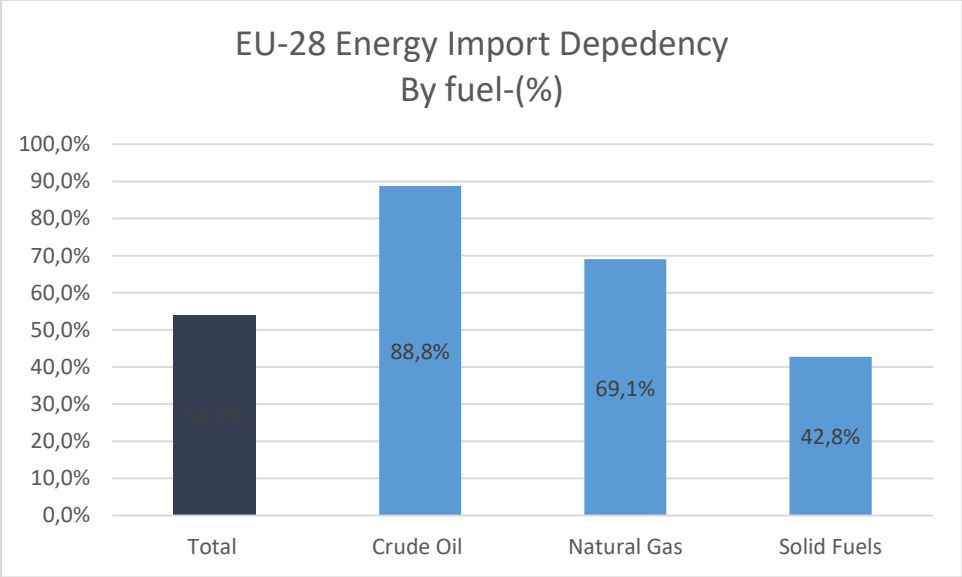
its electricity consumption from the UK[87]. Likewise, with regards to the gas trade the UK imports more gas from the EU (5%) than the EU imports from the UK (3%)[88]. Moreover, as far as the BREXIT impact on LNG imports it will also be limited. UK's LNG capacity is underutilized as well as EU's overall LNG capacity so the EU will manage LNG imports with the available infrastructure in the rest Member States. Consequently, the impact of BREXIT on security of supplies of the EU will negligible. It is rather the UK that will suffer more consequences with the exception of Ireland which imports 56% of is gas consumption from the UK[89].

- *Import Dependency*

The reduction of domestic primary energy has made European Union more reliant on primary energy imports in order to satisfy its demands. As a matter of fact EU-28 imported more than one half of its needs in gross inland consumption in 2015. That year dependency on energy imports reached 54% of gross energy consumption, reflecting an increase of ten percentage points since 1990. Crude oil imports recorded the highest rate with 88.8%, whereas natural gas imports amounted to 69.1%. Solid fuels exhibited a considerably lower rate with 42.8%[90]. Regarding the cost of imports it has been reduced since 2012 by 54% from 38 € billion per month to 17.3 € billion per month in 2016[91]. Moreover, import dependency of EU is expected to increase until 2030 according to all scenarios of energy projection. In truth, the import dependency of oil will reach 90%, whereas that of natural gas will surpass 70%. Dependency on coal imports will follow the trend and it will amount to 48%[92].

[87] Bruegel Belgium, *The impact of BREXIT on the EU energy system,* European Parliament-Directorate General for Internal Policies, 2017, p. 71
[88] Ibid, p. 72
[89] For more information see Bruegel (2017), chapter 8
[90] Eurostat (a) (n.75)
[91] Eurostat (c), EU imports of energy products-recent developments [website], April 2017. Available from: http://ec.europa.eu/eurostat/statistics-explained/index.php/EU_imports_of_energy_products_-_recent_developments (accessed 25/10/2017)
[92] European Commission SWD (2014) (n.76), pp. 13, 102

Fig.4 EU-28 Energy Import dependency-By fuel (%) 2015



Source: Author's depiction of Eurostat figures

An important factor in evaluating energy dependency is the provenance of energy imports. Russia is the biggest supplier of the EU for natural gas and both in terms of value and net mass. In 2016 its share of value was 39.2% and of net mass 38.2%. Russia increased its shares in both categories comparing to 2015 imports from 39.1% and 37.5% respectively. The second largest supplier for EU-28 both in terms of net mass and value for natural gas is Norway. Norway competes Russia holding 34.1% of value share and 35.8% of net mass share. It should also be mentioned that in 2016 Norway saw its share decreased compared to 2015, when its shares were 34.8% and 37.3%. Algeria ranks third in natural gas supplies to the European Union with a considerably smaller share of value and net mass, around 15%. Qatar, Nigeria, Libya and other countries supply the Union with small amounts of natural gas.[93]

[93] Eurostat (c) (n.91)

Table.1 Extra-EU imports of natural gas, shares (%) of main trading partners-2016

Partner	Value (Share %)	Net mass (Share %)
Russia	39.7	38.2
Norway	34.1	35.8
Algeria	15.2	14.3
Qatar	5.1	5.8
Nigeria	2.1	2.1
Libya	1.4	1.5
Others	2.4	2.3

Source: Eurostat

As far as petroleum oils are concerned Russia is also the first supplier of EU in terms of value of imports. In particular, Russia is the dominant supplier with a share in value of 31.8% and of net mass 32.5% in 2016. Russia, actually increased its shares since 2015 from 28.4% and 29.2% respectively. Norway is the second supplier. However, contrary to natural gas shares where it competes Russia, this is not the case for petroleum oils. Despite it ranks second, Norway has a considerably smaller share of petroleum oils compared to Russia. The European Union imported 12.8% of its needs in petroleum oils from Norway in 2016 which amounted to 13.4% in terms of value. Regarding the rest share of petroleum oils market it is split among several suppliers. All the other suppliers hold percentages smaller than 8% in terms of net mass (Kazakhstan, Iraq, Saudi Arabia Nigeria and some even smaller, less than 5% (Azerbaijan, Algeria, Iran, Angola, Libya and Mexico)[94].

[94] Eurostat (c) (n.91)

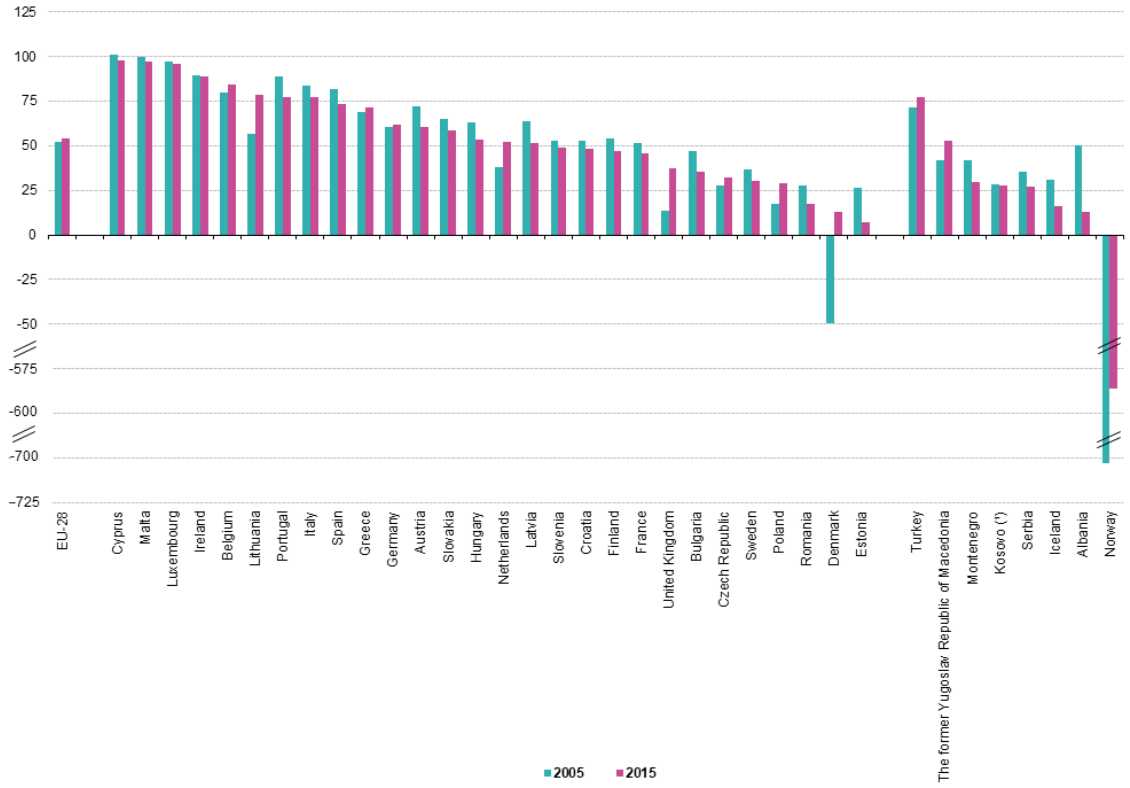
Table.2 Extra-EU imports of petroleum oils, shares (%) of main trading partners-2016

Partner	Value (Share %)	Net mass (Share %)
Russia	31.8	32.5
Norway	13.4	12.8
Kazakhstan	7.2	6.9
Iraq	7.1	7.7
Saudi Arabia	6.8	6.9
Nigeria	5.9	5.8
Azerbaijan	5.0	4.8
Algeria	3.8	3.4
Iran	2.9	2.9
Angola	2.5	2.5
Libyan Arab Jamahiriya	2.4	2.3
Mexico	2.1	2.3
Egypt	1.5	1.4
Others	7.6	7.8

Source: Eurostat

In reality, for a thorough understanding of EU's energy dependency on imports, a closer examination of single Member States' dependency is necessary. Even though almost all Member States import energy, there are huge discrepancies between them as far as their energy import dependency is concerned. In particular, Malta, Cyprus and Luxembourg were almost completely dependent on primary energy imports in 2015 with dependency rates more than 90%, despite the slight fall of the dependency rate compared to 2005. On the contrary, the dependency rate for Estonia, Denmark, Poland and Romania in 2015 was less than 30%. What is worth noting is that Denmark in 2005 had a negative dependency rate, which means that from a net energy exporter, became dependent on energy imports to satisfy its gross inland consumption at about 12%. Denmark along with Estonia, Poland and Romania had the lowest dependency rate, less than 30%, in 2015.

Fig.5 Energy Dependency rate-all products, 2005 and 2015



(*) This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.
Source: Eurostat (online data code: tsdcc310)

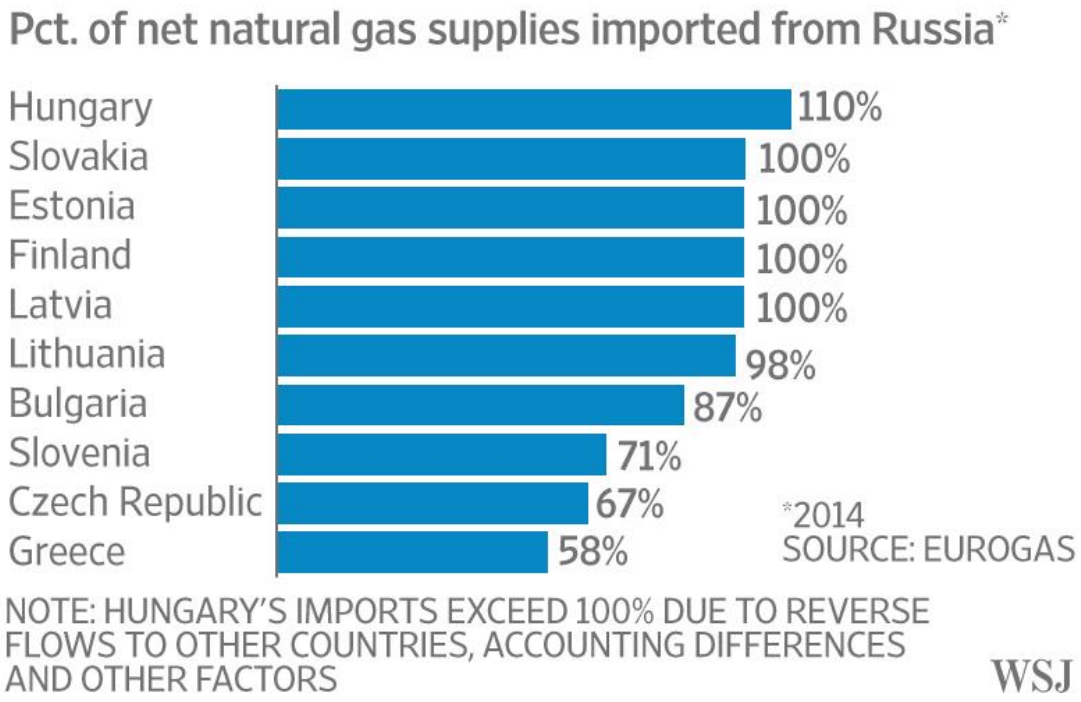
Apart from the dependency rate, the dependency on a single supplier is revealing for the security of supplies of the EU in total and of some Member States in particular. In 2016, for ten Member States more than 75% of their imports of natural gas came from Russia (Bulgaria, the Czech Republic, Estonia, Latvia, Austria, Poland, Romania, Slovenia, Slovakia and Finland). Moreover, the same seven countries imported more than 75% of their petroleum oils imports from Russia (Bulgaria, Estonia, Lithuania, Hungary, Poland, Slovakia, and Finland[95].

Several EU countries are heavily dependent for their total energy imports on Russia. Remarkably, in 2014 Slovakia, Estonia, Finland and Latvia satisfied their needs in natural

[95] Eurostat (c) (n.91)

gas supplies by importing completely from Russia. That is the case for Hungary as well whose dependency on Russia for natural gas supplies surpassed 100% (110%) in 2014 if reverse flows to other countries are taken into account. Likewise, Lithuania and Bulgaria were almost completely dependent on Russia (98% and 87% respectively) in 2014, whereas Slovenia and the Czech Republic imported that year more than two thirds of their natural gas imports from Russia (71% and 67% respectively). Greece as wells imported 58% of its need from Russia.

Fig.6 Net natural gas supplies (%) imported from Russia-2014



Source: WSJ, EUROGAS

From the abovementioned statistics it is obvious that import dependency is not of the same scale for all Member States. Some states are absolutely dependent on importing

gas from Russia, others acts as transit state while for some the relation with Russia in terms of gas supply can be defined as interdependency.

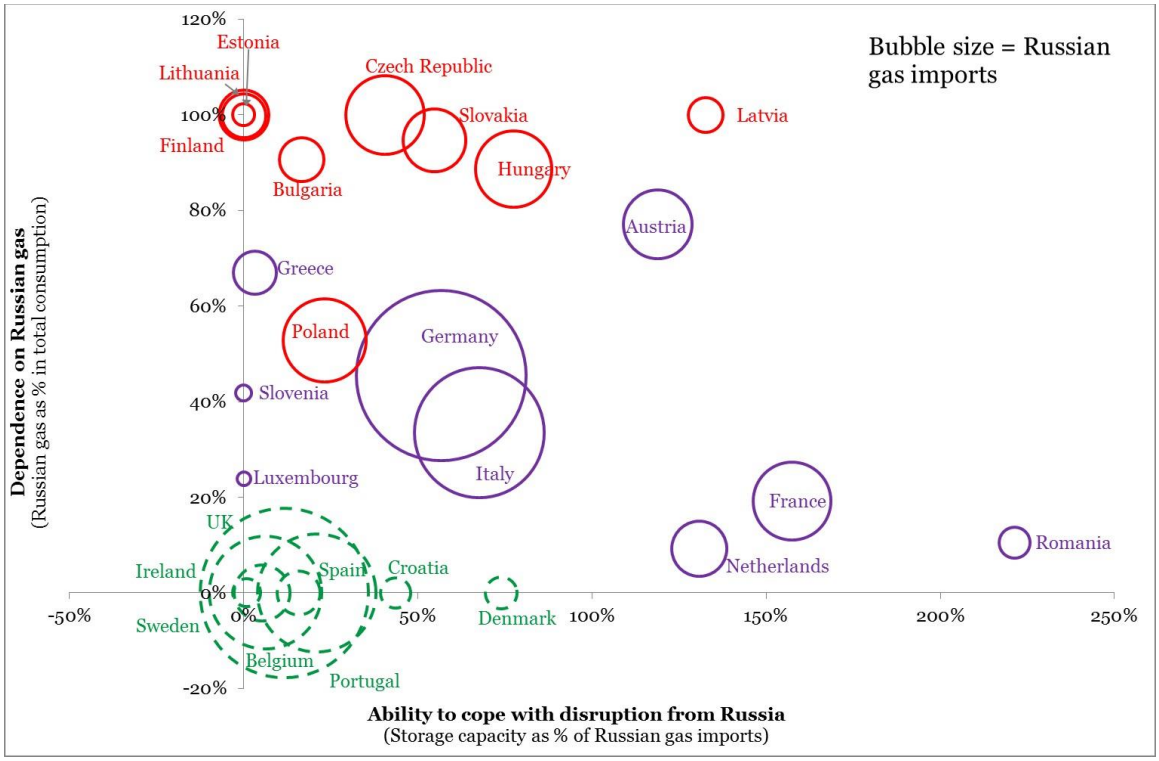
However, import dependency on a single supplier is not sufficient on its own to indicate the overall dependence of a consumer country on a gas source. As Brenda Shaffer explains the proportion of the supply/market from the state's overall gas supply, the share of natural gas in the state's overall fuel mix, the number of the state's suppliers and related infrastructure and the ability of the electricity generation and industry to switch fuels if supplies are disrupted are factors defining the exposure of a country to a single supplier[96]. Some of them are vulnerable, whereas others are sensitive should a change in their relations with Russia occur[97].

The following figure the exposure of EU Member States' to disruption of natural gas supplies from Russia. On the vertical axis the share of Russian gas in the state's total energy consumption is depicted. The horizontal axis presents the storage capacity of a country as share of Russian gas imports, whereas the size of the circle represents the Russian gas imports.

[96] Shaffer, B., 'Natural gas supply stability and foreign policy', *Energy Policy,* vol. 56, 2013, p. 117

[97] For an analysis on dependence and interdependence between states and for the concept of sensitivity and vulnerability see Keohane, R. O. & Nye, J., *Power and Interdependence*, 2nd edn, USA, Scott, Foresman and Company, 1989 especially pp. 12-18

Fig. 7 EU Member States' exposure to disruption of Russian gas



Source: IEA 2014, retrieved from ECFR

Countries in red are vulnerable in case of disruptions of Russian gas. For instance, the Baltic States and Finland are vulnerable against a disruption of supplies from Russia given that they import their totality of natural gas needs from Russia and they lack interconnection or access to LNG facilities. The LNG facility in Lithuania was built at the end of 2014 and it seems that it has contributing to alleviating the country's exposure to Russian natural gas as Lithuania's import dependency on natural gas reduced to 99.7% in 2015[98]. In Finland three LNG plants are under construction expected to operate in 2017/2018 and another one is planned, in Latvia an LNG facility is planned and in Lithuania two expansions of the existing LNG plant are under construction[99]. These new

[98] *EU Energy in Figures. Statistical Pocketbook* (n.74), p. 205
[99] Gas Infrastructure Europe, 'LNG Map 2016'. Available from: http://www.gie.eu/download/maps/2016/GIE_LNG_2016_A0_1189x841_FULL.pdf (accessed 27/11/2017)

infrastructure are expected to enhance the energy security of these countries. Bulgaria is also vulnerable, despite its interconnectivity with Romania. When the interconnector with Greece (IGB) is built (expected in 2020, construction has not started yet) and if the FSRU facility is built in Alexandroupoli, Greece, Bulgaria will have a better position against Russian supplies.

Countries in purple are sensitive either because the share of Russian gas in their consumption mix is low or because they have indigenous resource along with LNG facilities, such as Greece which has important coal reserves and an LNG facility in Revythousa, or because they are interdependent with Russia, such as Germany. Finally, countries in green have little or no interaction at all with Russia directly and therefore they are not exposed to supplies disruption from Russia.

All in all, despite differences among Member States it is clear that the European Union depends on external suppliers and especially on Russia for its energy supplies which warrants concerns about its security of supply. The European Commission and the European Union in general has realized the danger that lurks with respect to security of supply and has issued several documents and launched several initiatives for securing energy supplies, which will be presented next.

1.2 European Union's Energy Security Strategy

Energy had been traditionally an area where the Member States of the European Union used to have exclusive competence and legislative provisions about this sector were adopted only under the Union's competence on internal market. It was only in 2009 that the European Union was explicitly granted competence on energy according to the Treaty on the Functioning of the European Union (TFEU). Article 4 TFEU defined that European Union has a shared competence with the member states in this area and article 194§1 TFEU set the specific legal basis of EU for the energy sector:

"*In the context of the establishment and functioning of the internal market and with regard for the need to preserve and improve the environment, Union policy on energy shall aim, in a spirit of solidarity between Member states, to:*

a) *ensure the functioning of the internal market*
b) *ensure security of energy supply in the Union*
c) *promote energy efficiency and energy saving and the development of new and renewable forms of energy; and*
d) *promote the interconnection of energy networks"*

Nevertheless, Member States retained their competence to decide on their energy mix, the structure of their energy supply and the conditions for exploiting their energy resources (Art. 194§2).

Article 191 TFEU has also served as legal basis for regulatory measures concerning renewable energy as it is the legal basis for measures in respect of environmental matters.

Even though security of energy supply was legally set as an aim of the Union's energy policy only in 2009, there have been several initiatives on the issue the years before. In 2000 the European Commission the Green Paper issued 'Towards a European strategy for the security of energy supply', which was followed in 2006 by the Green Paper 'A European Strategy for Sustainable, Competitive and Secure Energy'. The latter called for the establishment of a rapid solidarity mechanism in case of energy crisis so uninterrupted energy supply be ensured.

In 2008 the Commission in its Communication 'Second Strategic Energy Review-An EU Energy Security and Solidarity Action Plan' proposed an action plan focusing on five points: a) infrastructure needs and diversification of energy supplies, b) external energy relations, c) oil and gas stocks and crisis response mechanisms, d) energy efficiency and e) making the best use of the EU's indigenous energy resources[100].

[100] European Commission, 'Second Strategic Energy Review-An EU Energy Security and Solidarity Action Plan' COM (2008) 781 final, p.3

The European Commission in its next proposal about energy security focused on its external dimensions suggesting among others the strengthening of partnerships with EU's partners and the building of the external dimension of its internal energy market[101]. It also proposed the establishment of an information exchange mechanism on intergovernmental agreements (IGAs) between Member States and third countries in the field of energy, which was eventually adopted in 2012[102]. However, this decision provided for an ex-post assessment of the IGAs' compatibility with EU law, which proved inefficient. For this reason, this mechanism was replaced by an ex-ante assessment procedure in May 2017[103].

Finally, in 2014 the Commission adopted the Communication European Energy Security Strategy to respond to the energy security challenges the Union faces. Before a closer examination of this proposal it should be noted that the energy security crises the EU experienced in 2006 and 2009 because of the dispute between Russia and Ukraine and the 2014 crisis again between these two countries contributed significantly to the Union's mobilization in this field[104]. In fact, the European Commission has admitted officially that 'this was a stark wakeup call pointing to the need for a common European energy policy'[105].

[101] European Commission, 'Security of energy supply and international cooperation-The EU Energy Policy: Engaging with Partners beyond Our Borders', COM (2011) 539 final, p. 3

[102] European Parliament and Council Decision No 994/2012/EU of 25 October 2012 on establishing an information exchange mechanism with regard to intergovernmental agreements between Member States and third countries in the field of energy [2002] OJ L 299/13

[103] European Parliament and Council Decision (EU) 2017/684 of 5 April 2017 on establishing an information exchange mechanism with regard to intergovernmental agreements and non-binding instruments between Member States and third countries in the field of energy and repealing Decision No 994/2012/EU [2017] OJ L 99/1

[104] For more information the Ukrainian crises please see Stern, J., *The Russian-Ukrainian gas crisis of January 2006*, Oxford Institute for Energy Studies, 2006, Pirani, S., Stern, J. & Yafimava, K., *The Russian-Ukrainian gas dispute of January 2009: a comprehensive assessment*, Oxford Institute for Energy Studies, 2009

[105] European Commission (a), 'European Energy Security Strategy', COM (2014) 330 final, p. 2

- *The Communication 'European Energy Security Strategy'*

In this document the European Commission recognized that the 'most pressing energy security of supply issue is the strong dependence from a single external supplier'[106], meaning Russia, and set it as one of the pillars on which the Strategy is based.

Apart from the first pillar which urged for immediate actions for the EU to overcome a major disruption during the winter 2014/2015, all the other pillars have a forward-looking targeting. The other pillars are: a) strengthening emergency/solidarity mechanisms and protecting strategic infrastructure, b) moderating energy demand, c) building a well-functioning and fully integrated internal market, d) increasing energy production in the European Union, e), further developing energy technologies, f) diversifying external supplies and related infrastructure and g) improving coordination of natural energy policies and speaking with one voice in external energy policy.

With regard to the pillar of diversification the EU Energy Security Strategy suggests the multiplication of natural gas suppliers without, however, risking the reliability of suppliers, and suggests the creation of a natural gas hub in the South of Europe[107].

Moderating energy demand is of paramount in importance for the EU to mitigate its exposure to external energy suppliers. Therefore, there were set specific targets to be achieved by 2020, namely 20% cut in greenhouse gas emissions, 20% share of renewable energy consumption and 20% improvement in energy efficiency. These targets have been reviewed upwards for 2030, 40%, at least 27% and at least 27% respectively[108]. Moreover, the increase of domestic energy production will lessen EU's dependency on energy imports. Large scale integration of renewables and the exploitation of conventional and unconventional oil and gas resources in the EU, always in accordance with environmental

[106] European Commission (a) COM (2014) (n.105), p. 2
[107] European Commission (a) COM (2014) (n.105), p. 16
[108] European Commission, *2030 Energy Strategy* [website], Available from: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2030-energy-strategy (28/10/2017)

legislation, are the tools for increasing domestic production. In this framework, the role of South East Mediterranean seems to be very promising.

- *Energy Union*

The fact that energy was an issue of great concern for the European Union and especially for the Commission was confirmed in October 2014 with the appointment of a Commission Vice President for Energy Union, Maros Sefkovic, who was in charge to give birth to the project of Energy Union.

In April 2014 Donald Tusk, who was then Prime Minister of Poland and now President of the European Council, recognizing the excessive dependence of Europe on Russian energy had proposed the establishment of an energy union based on solidarity and common economic interests. Joint negotiations of energy contracts with Russia, solidarity mechanisms, building of energy infrastructure, use of available fossil fuels, diversification of external suppliers and reinforcement of the energy community were the principles on which the proposed energy union would be founded[109].

In May 2015 the European Commission launched the Energy Union initiative by adopting the Communication 'A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy'[110]. The Energy Union's goal is to offer EU's energy users secure, sustainable, competitive and affordable energy and its strategy is designed across five interrelated dimensions. The dimensions are: a) energy security, solidarity and trust, b) a fully integrated European energy market, c) energy efficiency contributing to moderation of demand, d) decarbonizing the economy and e) research, innovation and competitiveness.

Energy security is the first mentioned dimension of the Energy Union which stresses the importance attached to it. The Commission in its document for the Energy Union

[109] Tusk, D. (n.72)

[110] European Commission, 'A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy' COM (2015) 80 final

reaffirmed the crucial need for diversification of sources, suppliers and routes and called for the intensification of the Southern Gas Corridor and the support of natural gas hubs, which already exist in Northern Europe and are in the making in the Mediterranean. LNG can play an important role in the diversification and for this reason the EU has launched an LNG and gas storage strategy which will be later explored. The increase of the domestic energy production is another aspect of the energy security dimension of the EU[111].

Finally, the Commission recognized the necessity for securing energy supplies in its communication 'A policy framework for climate and energy in the period from 2020 to 2030'. It called for the sustainable exploitation of indigenous energy resources within the framework of an integrated market with undistorted competition and according to the European Union's law and its international commitments. Increase of energy efficiency will also contribute to securing energy supplies. The last measure is diversification of suppliers and of routes with regard to fossil fuels[112].

All the above-mentioned figures and European Union's initiatives evince that security of supplies is an important element of the Union's energy security strategy. In particular, increase of domestic energy production and diversification of both suppliers and routes is a vital necessity for the Union. The Eastern Mediterranean, after the recent discoveries, is an area which can contribute to securing supplies of the European Union.

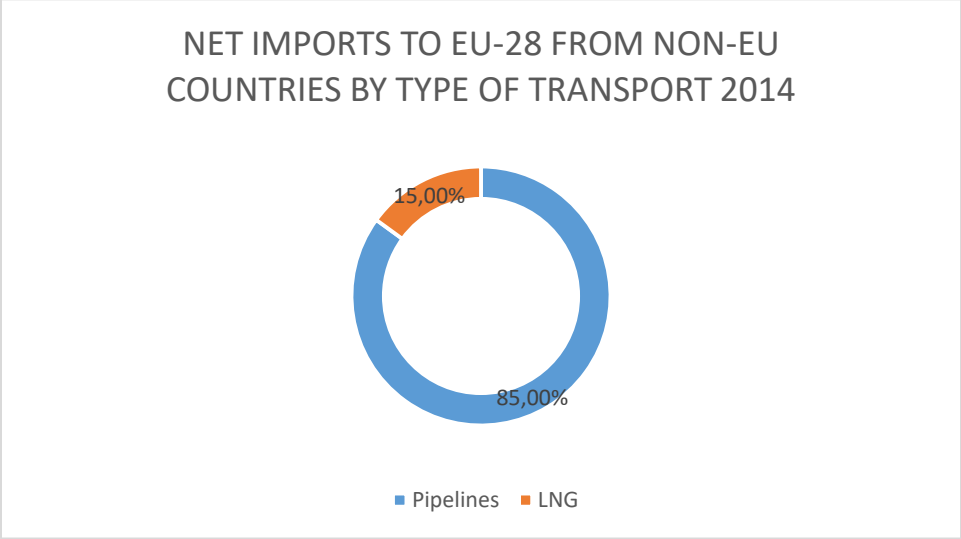
- *European Union's LNG and gas storage strategy*

Natural gas market globally is in a transition period. Shale gas which will introduce new supplies to the market, LNG which allows flexibility in gas transport and a trend for the development of a kind of world natural gas markets are all trends which will change natural gas market.

[111] European Commission COM (2015) (n.110), p. 4-5
[112] European Commission (b), 'A policy framework for climate and energy in the period from 2020 to 2030' COM (2014) 15 final, p. 11

Natural gas's share in energy trade has been increasing. In 2015 international gas trade accounted for 30.1% of global energy consumption and LNG's share was more than one third, 32.5%.[113] The EU is the world biggest importer of natural gas, which accounts for a quarter of the EU's overall energy consumption and the second largest importer of LNG in the world[114]. However, from its total natural gas imports from non-EU countries in 2014 only 15% was LNG. This underlines the potential of LNG's contribution to EU's energy security. LNG infrastructure allows for diversification of suppliers and thus the development of competition which can be reflected in lower prices. Moreover, it can enhance the EU' energy security in period of crisis since it can be obtained through short-term contracts instead of long-term ones which concern pipelines more. LNG has also limited environmental footprint compared to oil and solid fuels and for this reason it can also contribute the sustainability of the Union's energy policy and its climate policy.

Fig. 8 EU-28's net imports of natural gas by type



Source: EUROGAS

[113] BP Statistical Review (n.24), p. 4
[114] European Parliament Resolution of 25 October 2016 on EU strategy for liquefied natural gas and gas storage (2016/2059(INI))

The European Commission has identified the potential of LNG for diversifying sources since 2014 in its Communication for *European Energy Security Strategy* and has called for ensuring necessary infrastructure which will allow LNG to reach the EU[115]. In its document for the Energy Union it reiterated the role LNG can play in securing energy supplies for Member States and stressed the need for removing obstacles to LNG imports and for infrastructure that will link the LNG access points with the internal market[116]. That way bigger amounts of LNG, which are currently absorbed in the Asian market because of higher prices and better infrastructure, will be channeled to EU. According to the *EU strategy for liquefied natural gas and gas storage* the EU needs to take three steps in order to become more attractive market for LNG suppliers[117].

First of all the completion of the domestic gas market will send the right price signals to the global LNG market attracting larger LNG amounts as well as more investments. Next is the close cooperation with the international partners for the promotion of a free, liquid and transparent global LNG market.

But more importantly, new infrastructure needs to be built so every Member State can have access to LNG either directly or via interconnections. Even though the current LNG import capacity of the European Union is enough to meet 43% of the total gas demand (2015)[118], the are regions in the EU that do not have access to LNG facilities. The vast majority of LNG import terminals is located in the West and North Europe. South East Europe, Central Eastern Europe and the Baltic lack sufficient LNG infrastructure. It is no coincidence that countries with the biggest dependency on a single supplier of natural gas lack LNG facilities or interconnections with them, for example Lithuania, Estonia, Bulgaria.

[115] European Commission (a) COM (2014) (n.105), p. 15
[116] European Commission COM (2015) (n.110), p. 5
[117] European Commission, 'EU strategy on liquefied natural gas and gas storage', COM (2016) 49 final, pp.2-3
[118] European Commission-Fact Sheet, 'Liquefied natural gas and gas storage will boost EU's energy security,' *europa.eu* [website], 16 February 2016. Available from: http://europa.eu/rapid/press-release_MEMO-16-310_el.htm (25/11/2017)

The EU has in total 25 operational LNG import terminals and if BREXIT is taken into consideration this number falls to 22. Of them only one is in South East Europe (Greece) and only one in the Baltic (Lithuania). Italy has three operational LNG import terminals. In the Eastern Mediterranean there are two more terminals in Turkey, two in Egypt and one in Israel[119]. But even in cases LNG terminals exist they fail to be fully exploited due to lack of interconnectivity. Even worse some countries in the South East Europe, Central Eastern Europe and the Baltic (Bulgaria, Hungary, Lithuania) are heavily dependent on a single gas supplier which renders them more vulnerable in case of an energy crisis. Therefore, the creation of a regional gas hub including LNG will definitely improve the diversification of sources and consequently the energy security of these countries and of the EU overall. The potential of an energy hub in the Eastern Mediterranean and its linkage with the Southern Gas Corridor will be examined in the next section.

With regards to gas storage the Commission has underscored that the potential of gas storage facilities are not fully exploited and cross-border obstacles which hamper the cross-border transportation of gas jeopardize the Union's energy security, existing levels of storage capacity and future investments[120].

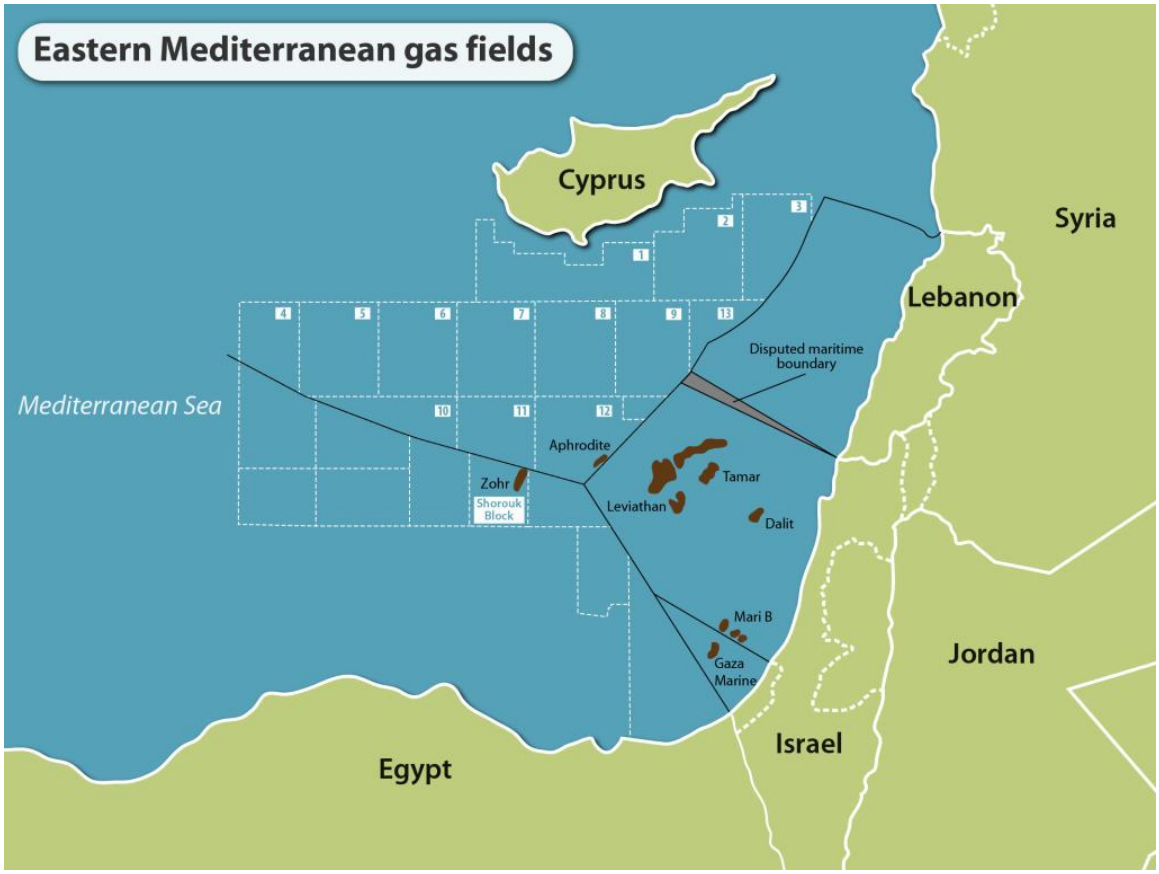
1.3 The importance of Eastern Mediterranean for the European Union's energy security

As it has been analyzed in the previous section one of the main goal of the European Union's goals since 2000 is the diversification of supplies, especially of gas supplies, for both economic and political reasons. Under this perspective Eastern Mediterranean is a key area given the estimates of recoverable oil and natural gas reserves in the area and especially after the recent discoveries of natural gas reserves offshore of several countries in the area.

[119] Gas Infrastructure Europe (n.99)
[120] European Commission COM (2016) (n.117), p.3

The US Geological Survey has estimated that there is a mean of 1.7 billion barrels of recoverable oil and a mean of 3.54 Tcm of natural gas in the Levant Basin, which encompasses approximately 83,000 km^2 of the Eastern Mediterranean area[121]. According to its assessment the Nile Delta Basin contains a mean of 1.8 billion barrels of recoverable oil, a mean of 6.3 Tcm of natural gas and a mean of 6 billion barrels of natural gas liquids[122].

Fig.9 Natural gas fields in the Eastern Mediterranean region



Source: Energy Routes

[121] U.S. Geological Survey, *Assessment of undiscovered oil and gas resources of the Levant Basin province, Eastern Mediterranean,* Fact sheet 2010-3014, March 2010

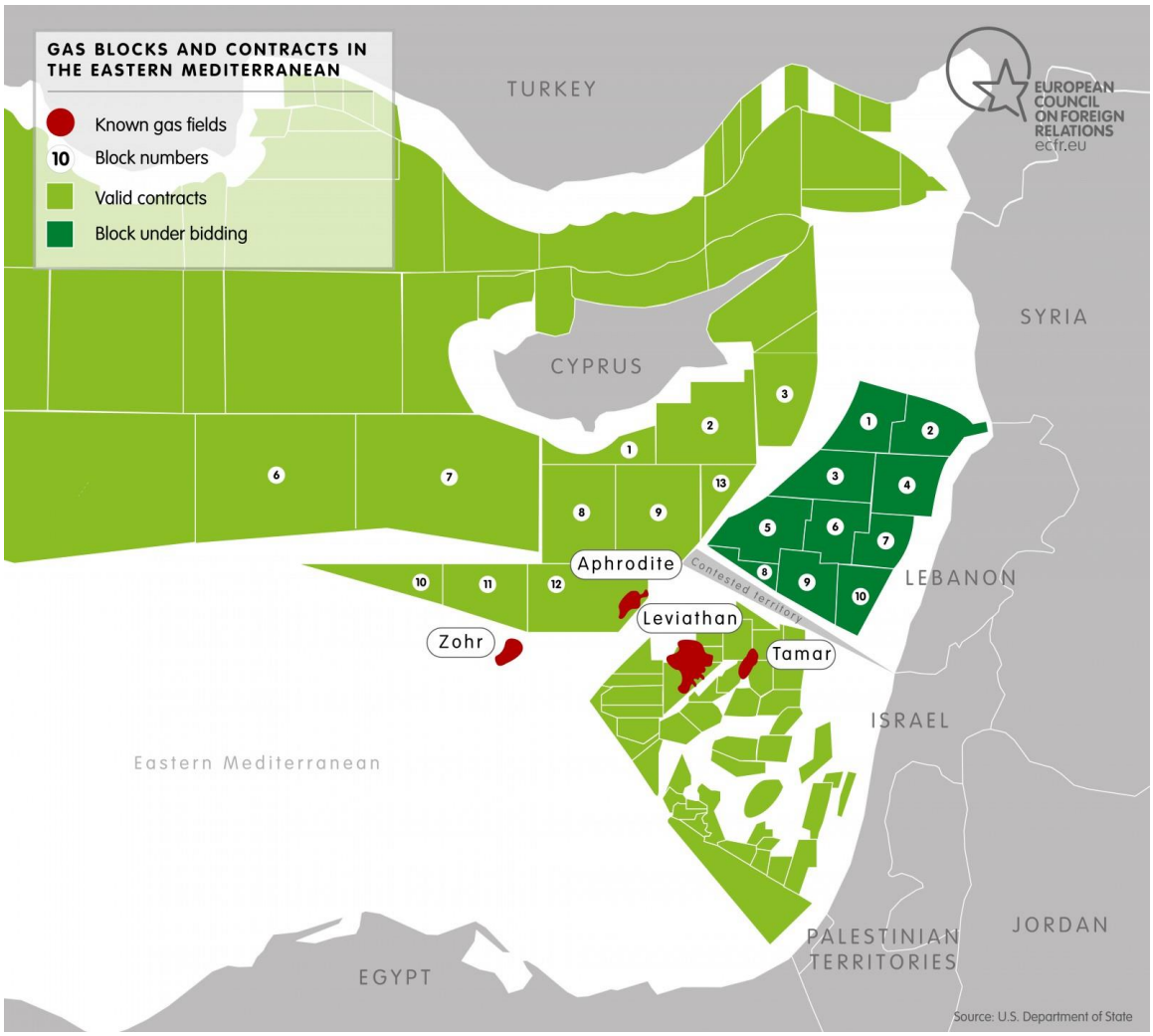
[122] U.S. Geological Survey, *Assessment of undiscovered oil and gas resources of the Nile Delta Basin province, Eastern Mediterranean*, Fact sheet 2010-3027, May 2010

Even though offshore exploration activities had been conducted before in the Eastern Mediterranean (they started in late 1960s), the discoveries in the first decade of the 21st century seem to introduce a new era for the area. In 2009 Noble Energy announced the discovery of large gas reserves in the Levant Basin. The Tamar field, when it was originally discovered offshore Israel in 2009, was estimated that it contained 280 bcm of gas reserves and 13m barrels of condensate[123]. Nevertheless, new discoveries in 2013 increased these number to 307 cm and 15m respectively[124],[125]. Tamar has been used for Israel's domestic gas consumption. The offshore Leviathan, which is off the northern coast of Israel was discovered in 2010 and holds 620 bcm which are planned to be channeled at a large extend to exports and 40m barrels of natural gas condensates[126],[127]. The reserves of two more field offshore Israel, Tanin and Karish discovered in 2012 and 2013 respectively, have been revised upward lately. The operator company, Energean, announced that they contain 136 bcm of natural gas reserves and 33m barrels of oil and the potential for 71m barrels more[128]. The Aphrodite field's natural gas reserves, which is offshore Cyprus and was discovered in 2011, have been reviewed from 110 bcm to 130 bcm, whereas the field also contains 9m barrels of condensate[129]. These findings were

[123] Dellek Drilling, Tamar Gas Field, *dellekdrilling.co.il* [website], Available from: http://www.delekdrilling.co.il/en/project/tamar-gas-field (accessed 2/11/2017)
[124] ibid
[125] A report by Netherland, Sewell & Associates in 2017 indicated that Tamar field contains 318 bcm of proved and probable reserves of natural gas-Reuters, 'Partners in Israel's Tamar raise gas reserves estimates by 13pct', *Reuters*, 2 July 2017. Available from: https://www.reuters.com/article/israel-natgas/partners-in-israels-tamar-raise-gas-reserves-estimate-by-13-pct-idUSL8N1JT09K (accessed 2/11/2017)
[126] Azran, E., 'The biggest-ever infrastructure project in Israel get under way, *Haaretz,* 27 February 2017. Available from: https://www.haaretz.com/israel-news/1.774036 (accessed 2/11/2017)
[127] It should be mentioned that the Israeli government revised downwards this figure in 2016 and announced that Leviathan holds 20% less natural gas reserves, namely 500 bcm-The Times of Israel, 'Leviathan fields reserves 20% smaller than reported', *The Times of Israel,* 5 June 2016. Available from: https://www.timesofisrael.com/leviathan-field-reserves-20-smaller-than-reported/ (accessed 2/11/2017)
[128] Globes, 'Energean doubles estimates for Karish, Tanin gas reserves, *Globes* [website], 2 November 2017. Available from: http://services.globes.co.il/en/article-energean-doubles-estimates-for-karish-tanin-gas-reserves-1001210170 (accessed 4/11/2017)
[129] Offshore, 'Gas reserves increase at Aphrodite offshore Cyprus', *Offshore* [website], 26 November 2014. Available from: http://www.offshore-mag.com/articles/2014/11/gas-reserves-increase-at-aphrodite-offshore-cyprus.html (accessed 2/11/2017)

followed by the discovery of the huge field Zohr offshore Egypt which is estimated to hold 850 bcm of natural gas 5.5. btoe[130].

Fig.10 Gas blocks and contracts in the Eastern Mediterranean



Source: U.S. Department of State

[130]The history of Zohr, *eni.com* [website]. Available from https://www.eni.com/en_IT/operations/upstream/exploration-model/zohr-egypt.page (accessed 1/11/2017)

These reserves, even if a great amount of them will be used for domestic consumption in Israel, Cyprus and Egypt, are enough for some exports to the European Union with natural in the near future. Eastern Mediterranean can serve diversification goals of the EU by its linkage with the Southern Energy Corridor and the creation of a regional hub.

Southern Gas Corridor is a new route for diversifying EU's supply routes and thus increasing the dependence of Member States on a single supplier of natural gas and other resources. Gas from the Caspian Basin, Central Asia, Middle East and the Eastern Mediterranean Basin will be transported to the EU via the Southern Gas Corridor.

Fig. 11 Expanded Southern Corridor

NB.: The TANAP and TAP gas pipelines as well as Turkish Stream are under construction, with IGB at an advanced planning stage with FID already taken. The IAP, the IGI Poseidon in connection with East Med pipeline and the Vertical Corridor are still in the study phase.

Source: IENE

The EU plans to import originally 10 bcm of gas via the Southern Gas Corridor (Caspian Basin, Central Asia, Middle East and Eastern Mediterranean Basin) when it opens in 2019-

2020 and in the future 80-100 bcm per year[131]. The Trans Adriatic Pipeline (TAP) which is currently under construction is expected to start delivering gas to Greece, Albania and Italy from Shah Deniz II field in Azerbaijan in 2020. TAP, which will be connected with TANAP pipeline in the Greek-Turkish borders to transport Caspian gas, will originally deliver 10 bcm/year with the possibility for double throughput at 20bcm/year.

The development of a regional hub in the Mediterranean given the recent discoveries in Eastern Mediterranean and already exploited reserves in Algeria are also part of the Southern Corridor. Eastern Mediterranean gas can enter the EU through several entry points and then via interconnections reach Eastern Europe or Italy. The East Med pipeline connecting Israel, Cyprus, Greece and Italy, a connection of East Med Pipeline with Western Balkans via Ionian Adriatic pipeline, a FSRU in Alexandroupoli, Greece, which can connect with the IGB and from then to the gas system of Eastern Europe via a vertical corridor, an LNG plant in Croatia or exports of the region's gas to the EU via Turkey are all options for supplying the EU with gas from Eastern Mediterranean and thus diversifying its routes and suppliers.

Nonetheless, despite the various options some of them can materialize but what is more important is the amount of gas of the region that will reach the EU at the end. In 2013 Israel decided that about 300 bcm are reserved for exports, whereas 450 bcm will be secured for the domestic market[132]. With regard to Cyprus from the 130 bcm available reserves about 70-100 bcm will be exported given that the island's needs in natural gas will be limited to 30 bcm[133]. So, in total there are about 400 bcm available for exports from Cyprus and Israel, which is equivalent to 16 bcm per year in a 25-year development plant. Given that in 2015 EU's consumption of natural gas was 402.1 bcm[134] 16 bcm from

[131]European Commission, 'Gas and oil supply routes', *europa.eu* [website]. Available from: https://ec.europa.eu/energy/en/topics/imports-and-secure-supplies/gas-and-oil-supply-routes (accessed 18/11/2017)
[132] Israeli Ministry of Energy, 'Israel's export options'. Available from: http://www.energy-sea.gov.il/English-Site/Pages/Oil%20And%20Gas%20in%20Israel/Israels-Export-Options.aspx (accessed 17/11/2017)
[133] Tsakiris, T., *Greece and the energy geopolitics of the Eastern Mediterranean*, LSE Ideas Strategic update 14.1., June 2014, p. 10
[134] BP Statistical Review (n.24), p. 23

Israel and Cyprus correspond almost to 4% of EU's annual needs in natural gas under on condition that all available amount for exports is channeled to the EU. Nonetheless, this is definitely not the case, but parts of exports will be channeled to the European Union. This means that Eastern Mediterranean resources cannot be a game changer for the European Union's energy security and its importance should be put into the right framework.

Eastern Mediterranean will contribute to the diversification policy of the European Union. Not only will the suppliers be diversified but also the routes. European Union by importing gas from this area will be able to lessen its dependence on Russia and bypass Ukraine even for the supply of smaller quantities. Those which will capitalize more on Eastern Mediterranean resources are some Member States. Depending on the export option chosen, which will be analyzed in the next chapter, energy security of the Member States in South Europe will be enhanced thanks to new infrastructure built. South European countries face problems with obsolete energy networks or with networks which are not well connected with the rest Member States. For instance, the option of the EastMed connecting Israel to Cyprus, then to Greece and then to Italy will enhance the energy infrastructure of these countries. Moreover, this option will allow the transport of gas to Bulgaria via the Interconnector pipeline between Greece and Bulgaria (IGB) giving Bulgaria the chance to limit its heavy dependence on Russia for natural gas. Greece will definitely benefit if options that position it as a transit country materialize. Moreover, it will diversify its natural gas suppliers since it will be able to substitute part its natural gas imports from Russia, Algeria and Turkey with Eastern Mediterranean gas. On top of that, one of the possible natural gas exporter countries, Cyprus, is an energy island and natural gas discoveries will allow it to diversify its energy mix-so far no natural gas has been used- and will improve its energy security. Moreover, Cyprus is a Member State of the European Union which means that is abides by the European law contrary to Russia which has often caused friction with the EU over this issue. Finally, the exploitation of Cypriot natural gas reserves will also increase, even to a small extent, the domestic energy production of the European Union.

The importance of Eastern Mediterranean as a region contributing to the European Union's energy security has been repeatedly stressed out by official European documents as well as by European Union's officers. For instance, in the Second Report on the State of the Energy Union of February 2017 the Commission remarked that:

"The Eastern Mediterranean is also a promising source of gas supply for the European Union. This increases the diversification opportunities and reduces import dependency on a single supplier, a key objective of the European Union"[135]

Later in March 2017 Commissioner for Climate Action and Energy Miguel Arias Canete affirmed the importance of Eastern Mediterranean for the European Union:

"In the next decades gas flows from the eastern Mediterranean region will play a vital role in the energy security of the European Union. The Commission strongly supports the construction of the necessary energy infrastructure and developing a competitive and liquid gas market in the region"[136]*.*

The fact that the European Commission considers Eastern Mediterranean as an important diversification option is also proved by the inclusion of several energy projects in the area in the list of the projects of common interest (PCI) funded by European sources. The first one is the EuroAsia Interconnector, an electricity undersea cable connecting Israel to Cyprus and then to Greece via Crete. The second is the East Med Pipeline which is planned to transport natural gas from Israel to Cyprus and then to Greece and then to Europe via Italy. The part that has been defined as PCI is the offshore pipeline from East Mediterranean reserves to Greece mainland via Crete. Gas infrastructure in Cyprus and LNG terminal in Northern Greece are also included in the third list of PCIs[137]. Both of the projects will be further examined in the next chapter.

[135] European Commission, 'Second Report on the State of the Energy Union' COM (2017) 53 final, p. 9
[136] European Commission Daily news [website], 31 March 2017. Available from http://europa.eu/rapid/press-release_MEX-17-825_en.htm 23/10/2017 (accessed 23/10/2017)
[137] Annex to Commission delegated regulation (EU)of 2 November 2017 amending Regulation (EU) No 347/2013 of the European Parliament and of the Council as regards the Union list of projects of common interest SWD (2017) 425 final, C (2017) 7834 final, pp. 7-9, 11

Lastly, another energy security initiative that demonstrates the importance of the Mediterranean in general and of the Eastern Mediterranean in particular is the Union for the Mediterranean Gas Platform (UfM Gas Platform). The Gas Platform was established in 2015 and aims at developing a structured dialogue among the countries in the area resulting in a Euro-Mediterranean gas market[138]. As Tagliapietra estimates this platform could focus on Eastern Mediterranean given that that the gas cooperation between EU and countries of the Western Mediterranean has been already well established (EU-Algeria, EU-Libya)[139].

1.4 Conclusion

Indigenous energy resources of the European Union have been dwindling with an increasing rate, whereas coal, which is abundant in the Union, faces environmental hurdles in its use and thus it does not overcome easily the acceptability threshold. On the other hand, the number of extra-EU suppliers is limited especially for natural gas complicating thus the European Union's energy security. The dispute between Russia and Ukraine and the consequent suspension of gas supplies in 2006 and 2009 raised awareness to the European Union for its heavy dependence on Russia energy resources. Therefore, it seems that natural gas discoveries in the Eastern Mediterranean can contribute to increasing the European Union's energy security especially in realizing the diversification policy. The energy partnership that has been recently developed among Israel, Cyprus and Greece can make a significant contribution to this effort. The development of this partnership and its repercussion fall within the scope of the next chapter.

[138] The UfM Energy platforms, Union for the Mediterranean [website]. Available from: http://ufmsecretariat.org/the-ufm-energy-platforms/ (accessed 1/11/2017)
[139] Tagliapietra, S. (a), *Energy: a shaping factor for regional stability in the Eastern Mediterranean?,* European Parliament-Directorate General for External Policies, 2017, p.11

Chapter 3

The Greek- Cypriot-Israeli energy cooperation

Despite the geographical proximity among Greece and Israel and Cyprus and Israel bilateral relations have been distanced if not hostile for many decades after the foundation of Israel. Several reasons can account for that and especially the way national interest was conceived in Greece and Cyprus. In the 21st century it seems that the situation has changed and the three countries have been building closer ties with energy cooperation being one of the motives for this rapprochement. After a short description of historical relations of Greece and Israel and Cyprus and Israel the development of the energy triangle is presented and the export options of East Mediterranean's gas are assessed.

1.1 Historical Relations of the countries

- *Greek-Israeli relations*

Since Israel's foundation in 1948 and for the next five decades the relations between Israel and Greece had been at their best distanced if not hostile; in either case they had developed within an atmosphere of mutual suspicion and accusations. Even though Greece recognized Israel de facto in late 1949[140] and diplomatic relations between the two countries were established in 1952 with the opening of a Greek consulate in Jerusalem, Greece only upgraded them to full ambassadorial level in 1990[141].

After the World War II Greece adopted a pro-Arab stance which culminated during the terms of Andreas Papandreou as Prime Minister, who was a fervent supporter of Arabs.

[140] Athanassopoulou, E., 'Responding to a challenge: Greece's new policy towards Israel', *Southeast European and Black Sea Studies,* vol. 1, no. 1, 2003, p. 111

[141] Κούμας, Μ., 'Η ίδρυση του κράτους του Ισραήλ', *Καθημερινή,* 5 July 2012, Available from Kathimerini.gr: http://www.kathimerini.gr/449654/article/epikairothta/kosmos/h-idrysh-toy-kratoys-toy-israhl (accessed 12/10/2017) (in Greek)

Greece voted against the UN resolution for the partition of Palestine in 1947[142] and thereinafter it was voting against Israel and for Arab states no matter what the issue[143]. As Tziampiris argues the policy of Greece against Israel was shaped under the framework of national interest. He explains that the fear of loss of more than twenty votes in the UN from Arab states with regard to the Cyprus issue and the fear that Egypt under Nasser's rules would adopt discriminatory measures against the Greek community in the country or even expel them distanced Greece from Israel[144]. Moreover, the supply of oil from the Arab states, the control of the Jerusalem Patriarchate and the unrestricted passage through the Suez Canal carved out the Greek policy away from Israel and close to the Arab states[145].

However, despite the problematic relations in the political field, trade relations between Israel and Greece were expanding at the same time and there was cooperation between the two states on agricultural, scientific and cultural issues[146].

The first sign of change came in 1990 when the right-wing government of Constantinos Mitsotakis recognized de jure Israel. Constantinos Mitsotakis was the first Greek Prime Minister to visit Israel in 1992[147]. Paradoxically the first step towards a Greek-Israeli cooperation was taken by Andreas Papandreou in 1994 when he signed a military agreement with Israel[148]. However, this agreement was never implemented. What pushed Greece to revise its policy against Israel after the mid-1990s was the increasing ties between Turkey and Israel which were confirmed with the signing of a military agreement between the two countries in 1996[149].

---

[142] UN GA Res 181 (29 November 1947) UN Doc A/RES/181 (II)
[143] Stergiou, A., 'Turkey's Neo-Ottoman policy and the Greece-Cyprus-Israel axis. Historical and geopolitical parameters, *Thetis,* vol. 20, 2013, p. 492
[144] Tziampiris, A., *The Emergence of Israeli-Greek Cooperation,* Springer, 2015, p. 48
[145] Stergiou, A. (n.143), pp. 491-492
[146] For more information see Stergiou, A. (n.), pp. 492-494
[147] Tziampiris, A. (n.144), p. 50
[148] Athanassopoulou, E. (n.140), p. 112
[149] For an analysis of the Turkish-Israeli relations under the securitization theory see Balcı, A.- Kardaş, T., 'The changing dynamics of Turkey's relations with Israel: An analysis of securitization', *Insight Turkey,* vol. 14, no. 2, 2012, pp. 99-120

By the end of the 1990s the idea of closer relations with Israel had matured in Greek government and was sealed with the first visit of the head of the Greek State, Constantinos Stefanopoulos, to Israel in 2000[150]. In 2004 the countries cooperated on security issues because of the Olympic Game in Athens, in 2006 Moshe Katzhav was the first President of Israel to visit Greece and in 2008 the two states conducted the joint military exercise Glorious Spartan [151] .

The beginning of the closer cooperation between two countries started in 2010 after the serious deterioration of the Turkish-Israeli relations[152] due to the Mavi Marmara incident and the blocking by Greece of a flotilla departing from Greek ports to break the Israeli blockade of Gaza in 2011[153]. In 2010 the Greek Prime Minister George Papandreou visited Israel and after three weeks the Israeli Prime Minister Benjamin Netanyahu reciprocated the visit. Thereinafter a series of visits of officials of one country to the other took place for the development of the Greek-Israeli cooperation in several sectors such as economy, defense and energy[154].

In the defense sector have been taking part in join military exercises sometimes with the participation of third sates, whereas in the economic field the flow of tourists from Israel

[150] Μητρόπουλος, Δ., 'Η αναθέρμανση σχέσεων Ελλάδας-Ισραήλ', Το Βήμα, 14 May 2000. Available from: http://www.tovima.gr/relatedarticles/article/?aid=122201 (accessed 6/11/2017)
[151] Tziampiris, A. (n.144), pp. 51, 77
[152] For a brief analysis of the Turkish-Israeli relations see Ulutaş, U., *Turkey-Israel: A fluctuating alliance*, SETA Policy Brief no. 42, January 2010
[153] The deterioration of the Turkish-Israeli relations had started a year earlier in 2009 because of the Israeli attack in Gaza and the sharp reaction of Turkey. In May 2010 Israeli commandos raided on the Turkish-owned Mavi Marmara ship, which was part of an aid flotilla attempting to break the blockade of Gaza, and killed ten Turks activists.
[154] For a detailed analysis of the development of the Greek-Israeli cooperation see Tziampiris, A. (n.144)

to Greece and Cyprus doubled in 2017 compared to 2016[155] and the Tourism Agencies of the three countries signed an agreement for promoting tourism among them[156].

- *Cypriot- Israeli relations*

In the late 1940s Cyprus-still a British colony- was a transit point of Jews survivors of the Holocaust on their way to Israel. Israel, soon after Cyprus's independence in 1960, opened an embassy in the island in 1961, despite the enormous pressure of the Arab states and especially that of Egypt to Cyprus to not allow it[157].

During the Cold War the pro-Arab stance of Cyprus and the neutral position of Israel regarding Turkey's invasion to Cyprus in 1974 hindered the development of closer ties between the two countries[158]. In 1993 the bilateral relations started being significantly upgraded and several bilateral agreements were signed. This was followed by the opening of the Cyprus's embassy in Israel in 1994[159].

[155] Famagusta News, 'Τουρισμός: Εκπλήξεις από Ισραήλ-Γερμανία για το ρεκόρ εννιαμήνου', *Famagusta News* [website], 18 October 2017. Available from: https://famagusta.news/news/138196/ (17/11/2017), Διψήφια αύξηση το 2017 στις τουριστικές αφίξεις από το Ισραήλ-Σημαντικές επαφές της Υπουργού Τουρισμού κας 'Ελενας Κουντουρά στο Τελ Αβίβ με τον Ομόλογό της και τουριστικούς πράκτορες για τη δυναμική προώθηση του ελληνικού τουρισμού', *Υπουργείο Τουρισμού-Ελληνικός Οργανισμός Τουρισμού* [website], 9 February 2017. Available from: http://www.gnto.gov.gr/el/09022017-%CE%B4%CE%B9%CF%88%CE%AE%CF%86%CE%B9%CE%B1-%CE%B1%CF%8D%CE%BE%CE%B7%CF%83%CE%B7-%CF%84%CE%BF-2017-%CF%83%CF%84%CE%B9%CF%82-%CF%84%CE%BF%CF%85%CF%81%CE%B9%CF%83%CF%84%CE%B9%CE%BA%CE%AD%CF%82-%CE%B1%CF%86%CE%AF%CE%BE%CE%B5%CE%B9%CF%82-%CE%B1%CF%80%CF%8C-%CF%84%CE%BF-%CE%B9%CF%83%CF%81%CE%B1%CE%AE%CE%BB-%CF%83%CE%B7%CE%BC%CE%B1%CE%BD%CF%84%CE%B9%CE%BA%CE%AD%CF%82-%CE%B5%CF%80%CE%B1%CF%86%CE%AD%CF%82-%CF%84%CE%B7%CF%82 (accessed 17/11/2017)

[156] Enikonomia.gr, 'Επισφραγίστηκε κλαδική συμφωνία για τον τουρισμό μεταξύ Ελλάδας-Κύπρου-Ισραήλ', *enikonomia.gr* [website], 3 July 2017 http://www.enikonomia.gr/tourism/158700,episfragistike-kladiki-symfonia-gia-ton-tourismo-metaxy-elladas-k.html (accessed 17/11/2017)

[157] Levey, Z., 'Israel's entry into Cyprus, 1959-1963: Diplomacy and strategy in the Eastern Mediterranean', *Middle East Review of International Affairs,* vol. 7, no.3, 2003, p. 73

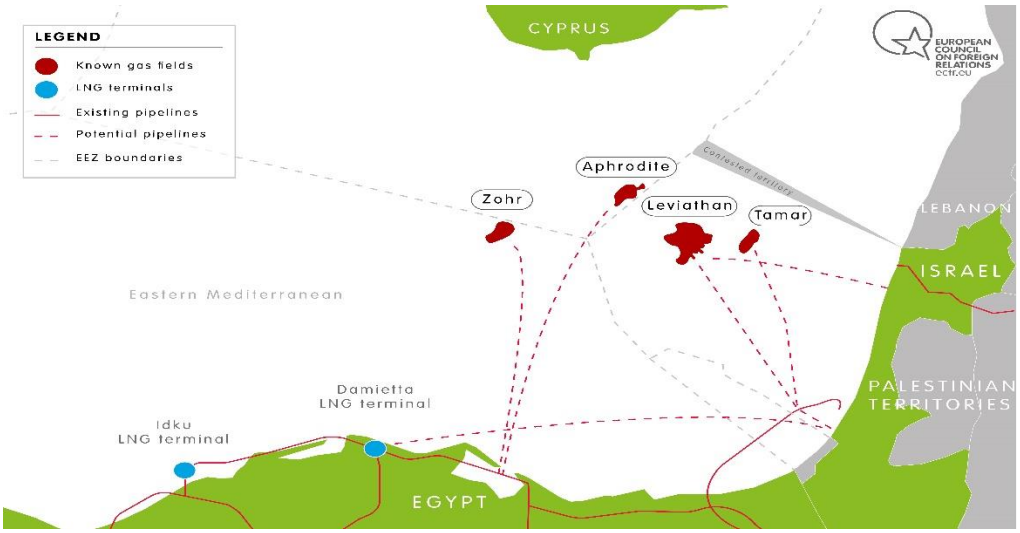
[158] Stergiou, A. (n.143), p.496

[159] Levey, Z. (n.157), p.73

As in the case of Greece and Israel the deterioration of the Turkish-Israeli relations in the late 2000s left room for an approach between Cyprus and Israel. Cyprus as well refused the departure of ships from its harbors to join the Gaza flotilla in 2010 and 2011[160].

On 17 December 2010 Israel and Cyprus reached an agreement on the delimitation of their exclusive economic zone (EEZ), which was a very important development given for their energy cooperation given the fact that coastal states can exploit resources within their exclusive economic zone[161]. The agreement entered into force in 25 February 2011[162]. Cyprus had also concluded earlier an agreement on the delimitation of the EEZ with Egypt in 2003, 17 February, which entered into force about a year later[163], and with Lebanon in 2007, which has not yet entered into force since the Lebanese government has not yet ratified it because of its dispute with Israel over their EEZ.

Fig. 12 Boundaries of exclusive economic zones in Eastern Mediterranean



Source: European Council on Foreign Relations

[160] Guzansky, A., Israel's periphery doctrine 2.0: the Mediterranean plus', *Mediterranean Politics,* vol. 19, no.1, p. 105

[161] United Nations Convention on the Law of the Sea, Art.56§1 (a)

[162] Agreement between the Government of the State of Israel and the Government of the State of Cyprus on the delimitation of the exclusive economic zone, Nicosia 17 December 2010, United Nations Treaty Series vol. 2740, no. 48387

[163] Agreement between the Republic of Cyprus and the Arab Republic of Egypt on the delimitation of the exclusive economic zone, Cairo 17 February 2003, United Nations Treaty Series vol. 2488, no. 44649

In March 2011 the Cypriot President Demetris Christofias became the first sitting President of Cyprus to pay an official visit in Israel during which two agreements, one in the educational field and the other in the financial, were signed[164]. Later in the end of 2011 the President of Israel Simon Peres visited Cyprus. In 2012 the first visit of an Israeli Prime Minister, of Benjamin Netanyahu took place and it was reciprocated in 2013 by the Cypriot President. Visits of officials of all levels in the two states continue to take place.

The two countries have also established a defense cooperation with joint military exercises. In fact, in 2016 Cyprus and Israel signed the Status of Forces Agreement defining the rights and obligations of each country's military personnel during joint activities[165]. Economic relations between the two countries have grown thriving. In 2016 Israel was the seventh larger exporter to Cyprus holding a share of 3.9% ($ 258m)[166] and at the same time the fourth biggest importer of Cypriot products holding a share of 6.9% ($ 114.8m) of Cypriot exports[167].

- *Reasons for the development of closer ties among the three countries*

Several reasons can account for the rapprochement of Greece, Cyprus and Israel. First of all, as Tziampiris analyzes in its book *The Emergence of the Israeli-Greek Cooperation* it is an effort of Greece to soft-balance Turkey's increasing power and assertive neo-Ottomanism[168]. Greece as well as Cyprus can potentially increase their leverage in the

[164] Israel Ministry of Foreign Affairs, 'President Peres meets with President of Cyprus Christofias', 14 March 2011. Available from: http://mfa.gov.il/MFA/PressRoom/2011/Pages/President_Peres_meets_President_Cyprus_14-Mar-2011.aspx (accessed 6/11/2017)

[165] SigmaLive, 'Cyprus-Israel to strengthen defence cooperation', *SigmaLive* [website], 24 February 2016. Available from: http://www.sigmalive.com/en/news/politics/142017/cyprusisrael-to-strengthen-defence-cooperation (accessed 17/11/2017). Cyprus and Israel have been conducting twice a year the joint military drill Onisilos-Gideon since 2014

[166] Trading Economics, 'Cyprus imports by country', *Trading Economics* [website]. Available from: https://tradingeconomics.com/cyprus/imports-by-country (accessed 5/11/2017)

[167] Trading Economics, Cyprus exports by country, *Trading Economics* [website]. Available from: https://tradingeconomics.com/cyprus/exports-by-country (accessed 5/11/2017)

[168] Tziampiris, A. (n.144), pp. 167-169, Tziarras, Z., 'The new geopolitical landscape in the Eastern Mediterranean: the Israeli perception', *Eastern Mediterranean Geopolitical Review,* vol. 1, Fall 2015, p. 38

region through their cooperation with Israel and enjoy bigger diplomatic flexibility given their bilateral disputes with Turkey. Secondly, the debt-stricken Greece and Cyprus can reap economic benefits from a cooperation with Israel especially with respect to high-tech products and tourism as it has already happened in the latter sector. Moreover, the two European countries can only benefit from the cooperation with a country which is a strategic ally of the USA where the powerful Jews lobby acts, a cooperation that can produce scalable effects.

From Israel's point of view Greece can offer to the Israeli defense forces the necessary strategic depth for their training exercises after the loss of Turkey's space for this purpose due to the cancellation of joint military drills between Israel and Turkey[169]. Cooperation with Greece can also help Israel escape its isolation in the Middle East[170]. In fact Guzansky argues that the development of ties with Greece and Cyprus fall within the 'periphery doctrine 2.0' of Israel, which advocates for the cooperation of Israel with peripheral states in an effort to find a substitute for Turkey[171]. Additionally, Greece and Cyprus can offer Israel a gateway to the European Union and thus an opportunity for Israel to strengthen its relations with the Union.

Last but not least energy cooperation was a strong motive for the development of closer ties between the two countries. The discoveries of natural gas in the Cypriot EEZ are not sufficient for an autonomous exploitation on behalf of Cyprus. Thus, Cyprus needs to cooperate with Israel or Egypt in order to export part of its resources. On the other hand, if Israel wants to channel its resources to the European Market, it needs Cyprus and Greece, which seem more reliable partners compared to the unpredictable Turkey and its neo-Ottoman ambitions.

---

[169] Borger, J., 'Turkey confirms it barred Israel from military exercise because of Gaza War', *The Guardian,* 12 October 2009. Available from: https://www.theguardian.com/world/2009/oct/12/turkey-israel-military-gaza (accessed 9/11/2017)

[170] Agdemir, A. M., 'A new partnership in the Eastern Mediterranean', *Mediterranean Quarterly*, vol. 26, no. 4, 2015, p. 52

[171] Guzansky, Y. (n.160). According to the original periphery doctrine Israel in the beginning of its existence tried to balance pan-Arabism and break its isolation by establishing relations with its peripheral countries.

Finally, someone could argue that the rapprochement of Turkey and Israel might suspend or cut the dynamic of the tripartite cooperation given that the improvement of relations between Greece and Israel and Cyprus and Israel coincided with the break-up of the Turko-Israeli relations. However, this does not seem to be the case so. Israel sees its relations with Cyprus and Greece independently from developments-either positive or negative- in its relations with Turkey[172].

1.2 The energy triangle

The term energy triangle refers to the joint natural gas exploitation among Cyprus, Greece and Israel[173]. The discussions about fostering energy cooperation among the three states have started since the discovery of the Aphrodite field in 2011.

In his visit to Israel in December 2011 President Christofias agreed with his counterpart to expand the cooperation between the two countries in the energy field and specifically in the field of gas[174]. Few months later in November 2012 the three countries agreed on setting up a working group for discussing a potential Eastern Mediterranean Energy Corridor that is for exploring natural gas export options from Cyprus and Israel to Greece, and another working group for a power cable linking the three countries[175].

In 2013 the Israeli companies Delek and Avner marking actively the beginning of the energy cooperation between Cyprus and Israel became partners in the consortium developing block 12 of the Cypriot EEZ where the Aphrodite field lies. Each one holds 15% and Noble Energy the rest 70%. The three companies have also signed a MoU with the Cypriot Government for the building of an onshore LNG plant in Vasilikos, Cyprus[176].

---

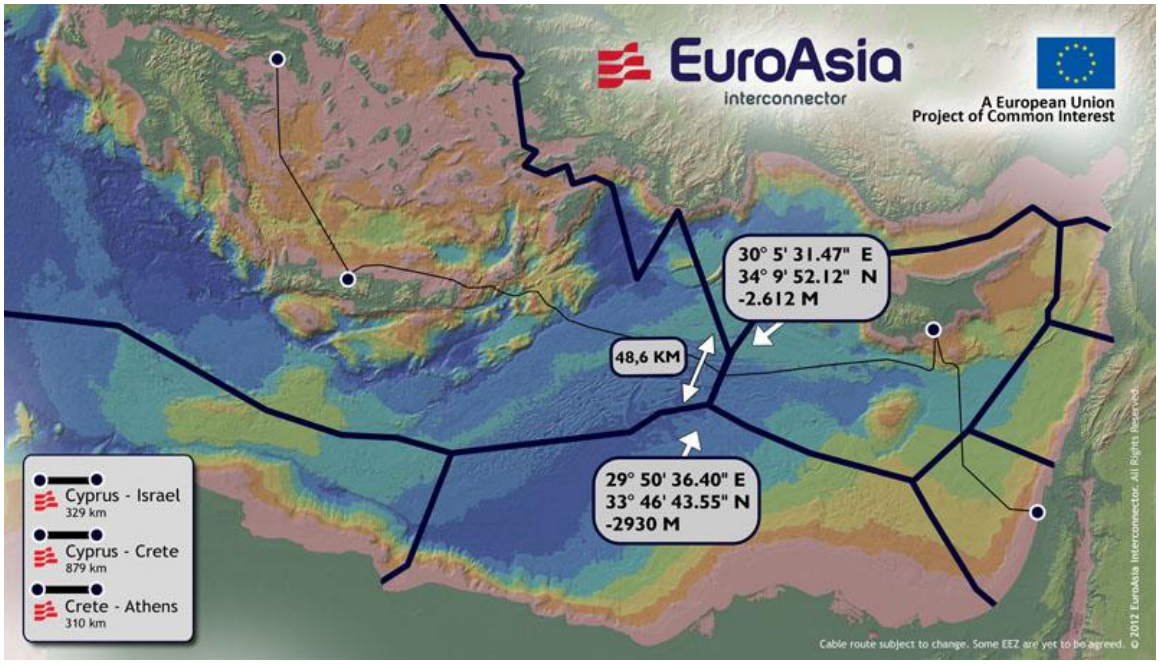
[172] Tziarras, Z. (n.168) p. 40
[173] Agdemir, A. M. (n.170), p. 56
[174] Israel Ministry of Foreign Affairs (n.164)
[175] Globes, 'Israel, Cyprus, Greece mull energy corridor', *Globes* [website], 8 November 2012. Available from: http://www.globes.co.il/en/article-1000797089 (accessed 6/12/2017)
[176] LNG World News, 'Cyprus inks MoU for LNG project with Delek, Noble and Avner', *LNG World News* [website], 26 June 2013. Available from: http://www.lngworldnews.com/cyprus-inks-mou-for-lng-project-with-delek-noble-and-avnear/ (9/11/2017)

In the same year in August Greece, Cyprus and Israel signed a tripartite MoU for cooperation on sewage treatment and on protection of infrastructure located in natural gas fields in the Mediterranean. The MoU stated the intent of the signing parties to link the electricity grids of the signing parties via an undersea cable for which a working group had been established a year earlier.

The EuroAsia Interconnector will have a capacity of 2000 MW power and it will be laid at 2000m depth[177]. This project is of great importance to Israel, which is an energy island especially after Egypt shut down the El Arish Ashkelon pipeline in 2012 which transported gas to Israel. Through this cable electricity can be exported to back to Israel in case of lack of internal supplies. The Chief Executive Officer of the EuroAsia Interconnector project said that the Israeli regulators are expected to approve the project in November 2017. He also estimated that, after the Greek and Cypriot regulators agreed on the allocation of the cross-border cost of the Interconnector between Cyprus and Greece in October 2017[178], the construction of the cable will start in the first quarter of 2018. The construction of the 1,520 km long cable is expected to last until 2022 with a cost of 3.5 billion euros for its first phase[179].

[177] Zeigher, A., 'Israel, Greece, Cyprus sign energy and water deal', Times of Israel, 8 August 2013. Available from: https://www.timesofisrael.com/israel-greece-cyprus-sign-energy-and-water-deal/ (accessed 14/11/2017)
[178] Κοιλάκος, Δ., 'ΡΑΕ και ΡΑΕΚ άναψαν πράσινο φως για την πρόοδο του EuroAsia Interconnector, energypress.com [website], 17 October 2017. Available from https://energypress.gr/news/rae-kai-raek-anapsan-prasino-fos-gia-tin-proodo-toy-euroasia-interconnector (accessed 17/10/2017)
[179] The Times of Israel, 'Work on Israel-Cyprus-Greece electricity link to start in 2018', *The Times of Israel,* 17/10/2017 https://www.timesofisrael.com/work-on-israel-cyprus-greece-electricity-link-to-start-2018/ (accessed 17/10/2017)

Fig. 13 EuroAsia Interconnector



Source: EuroAsia Interconnector

As far as the gas field is concerned in January 2016 Greece, Cyprus and Israel held the first tripartite meeting on the development and exploitation of natural gas discoveries in the Eastern Mediterranean which was followed by the second one at the end of the year (December 2016). The three leaders also agreed to create a regional emergency response form and discussed possibilities of cooperation in several fields expanding that way the cooperation among them[180].

In April 2017 the tripartite meeting between Greece, Cyprus and Israel was transformed into quadrilateral with the addition of Italy. The four countries after their meeting, in which EU Commissioner for Energy Miguel Arias Canete participated, announced a joint declaration where it was stated that natural gas reserves discovered are sufficient for complimentary projects by pipeline and LNG. One possible pipeline project is the East Med pipeline which will connect Israel to Cyprus and to Greece. In particular, the four

[180] Times of Israel, 'After fires Israel teams with Greece, Cyprus from emergency force', *Times of Israel*, 8 December 2016, Available from: https://www.timesofisrael.com/after-fires-israel-teams-with-greece-cyprus-for-emergency-force/ (accessed 1/11/2017)

countries acknowledged that the East Med Gas pipeline apart from being a project of 'strategic priority' it is technically and economically viable[181].

A couple of months later, in June 2017 the third tripartite conference among Greece, Cyprus and Israel took place in Thessaloniki, Greece. The Israeli Prime Minister Netanyahu met with his Greek and Cypriot counterparts, Mr. Tsipras and Mr. Anastasiades, and reaffirmed Israel interest to build East Med pipeline and promised to promote the project[182].

The latest development in the energy cooperation among the three states with the addition of Italy took place in December 2017, 5th when the four states held another quadrilateral meeting and signed a MoU about East Med pipeline. The MoU outlined the political commitment of the signing parties to promote the project. They also said that the intergovernmental agreement for the project is expected to be signed within 2018. The European Commission also participated in the meeting represented by the Deputy Director of the Directorate-General for Energy professing that way the strong support of the European Commission to the project[183]. In January 2018, 8th there will be held another tripartite meeting among Greece, Cyprus and Israel in Nicosia during which Israel is expected to clear its stance about the export option of its gas reserves[184].

East Med pipeline might be an export option to which Cyprus and Greece have devoted a big part of their diplomatic movements, however, it is not the only one. Other options

[181] East Med Pipeline Ministerial Summit in Tel Aviv April 3rd, 2017 Joint Declaration of Israel, Cyprus, Greece and Italy, 4 April 2017

[182] Kantouris, C., 'Netanyahu in Greece: Med pipeline would be 'revolution', *Times of Israel*, 15 June 2017, Available from Times of Israel: https://www.timesofisrael.com/netanyahu-in-greece-med-pipeline-would-be-revolution/ (accessed 15/10/2017)

[183] Energypress, 'Κύπρος, Ελλάδα, Ισραήλ και Ιταλία υπέγραψαν μνημόνιο συναντίληψης για τον αγωγό EastMed', *energypress.gr* [website], 5 December 2017. Available from: https://energypress.gr/news/kypros-ellada-israil-kai-italia-ypegrapsan-mnimonio-synantilipsis-gia-ton-agogo-eastmed (accessed 5/12/2017)

[184] Πιμπίσιης, Α., 'Κλείδωσαν οι τριμερείς με Ισραήλ και Ιορδανία', *Ο Φιλελεύθερος*, 5 December 2017. Available from: http://www.philenews.com/eidiseis/politiki/article/461783/kleidosan-oi-trimereis-me-israil-kai-iordania134 (accessed 5/12/2017)

involve Egypt and Turkey and they all should be examined for a thorough understanding of the energy developments in Eastern Mediterranean.

1.3 Export options

There are several export options for the natural gas discovered in Eastern Mediterranean either by pipelines or LNG or a combination of them. According to Israel's gas export policy, which was shaped in 2013, about 300 bcm are reserved for exports, whereas 450 bcm will be secured for the domestic market[185]. As for Cypriot reserves 70-100 bcm will be exported given that domestic needs rise up to 30bcm[186].

Fig. 14 Israel's export options

Source: Israeli Ministry of Energy

[185] Israeli Ministry of Energy, 'Israel's export options'. Available from: http://www.energy-sea.gov.il/English-Site/Pages/Oil%20And%20Gas%20in%20Israel/Israels-Export-Options.aspx (accessed 17/11/2017)
[186] Tsakiris, T. (n.133), p. 10

- *Israel-Jordan, Israel-Gaza*

Israel has been exporting gas from Tamar field to Jordan since the beginning of 2017 via a pipeline[187]. The amount exported raises up to 1.87 Bcm over a period of 15 years[188]. Another pipeline is expected to deliver 45 Bcm of gas from Leviathan field to Jordan in 2019-2020 over a period of 15 years[189].

The Israeli Ministry of National Infrastructure, Energy and water resources has decided to authorize the export of 0.25-0.4 B cm per year from Leviathan field to Gaza power stations via pipeline[190]. However, the materialization of such a plan is subject to the political situation between Israel and Gaza.

- *Israel-Turkey pipeline*

Another possible export route is a pipeline from Israel's Leviathan field to Turkey. The idea for an Israeli-Turkish pipeline was first generated in 2013 but the rift in the two countries' relation halted its development. Nevertheless, there has been recently a thaw between the two countries which revived the project for an Israeli-Turkish pipeline[191]. In

[187] Paraskova, T., 'Israel just started exporting natural gas to Jordan', *oilprice.com* [website], 2 March 2017. Available from: https://oilprice.com/Latest-Energy-News/World-News/Israel-Just-Started-Exporting-Natural-GasTo-Jordan.html (accessed 16/11/2017)

[188] Noble Energy New Release, 'Noble energy announces agreement to sell Tamar gas to multiple customers to Jordan', *Noble Energy* [website], 19 February 2014. Available from: http://investors.nblenergy.com/releasedetail.cfm?ReleaseID=826568 (accessed 18/11/2017)

[189] Reuters, 'Update 2-Israel's Leviathan gas to supply Jordan in $10bln deal', *reuters.com* [website], 26 September 2016. Available from: http://www.reuters.com/article/israel-gas-jordan/update-2-israels-leviathan-gas-to-supply-jordan-in-10-bln-deal-idUSL8N1C22N1 (accessed 16/11/2017)

[190] Globes, 'Israeli gov't to allow Leviathan gas sales to Gaza', *Globes* [website], 3 March 2016. Available from: http://www.globes.co.il/en/article-israeli-govt-to-allow-gas-exports-from-leviathan-to-gaza-1001108009 (accessed 19/11/2017)

[191] For the normalization of relations between Turkey and Israel see Baker, L., 'How gas could warm relations between Israel and Turkey', *Reuters* [website], 20 June 2016. Available from Reuters: http://www.reuters.com/article/us-israel-turkey-gas-insight/how-gas-could-warm-relations-between-israel-and-turkey-idUSKCN0Z60WJ (accessed 10/10/2017), Bakır, B., 'Dünden bugüne Türkiye-İsrail ilişkileri', *Habertürk,* 5 July 2016. Available from Habertürk: http://www.haberturk.com/yazi-dizisi/haber/1262938-dunden-bugune-turkiye-israil-iliskileri (accessed 10/10/2017), Girit, S. '5 soruda Türkiye-İsraeli ilişkileri neden normalleşti?', *BBC Türkçe,* 19 October 2016. Available from BBC Türkçe: http://www.bbc.com/turkce/haberler-turkiye-37703220 (accessed 9/10/2017), Hasan, A., 'Türkiye-İsrail ilişkileri bugün resmen normalleşti', Miliyet.com.tr, 5 December 2016. Available from Miliyet.com.tr http://www.milliyet.com.tr/turkiye-israil-iliskileri-bugun-siyaset-2356427/ (accessed 9/10/2017)

fact, the energy cooperation was an important factor for the normalization and evolvement of Turkish-Israeli relations as the Israeli Minister of Energy, Infrastructure and Water Resources Yuval Steinitz has admitted[192].

Fig. 15 Israel-Turkey subsea pipeline

Source: Israeli Ministry of Energy

[192] Cumhuriyet, 'İsrail ile işler tıkırında. Doğalgaz boru hattı anlaşması yıl sonuna kadar imzalanacak', *Cumhuriyet*, 13 July 2017. Available from Cumhuriyet: http://www.cumhuriyet.com.tr/haber/turkiye/780106/israil_ile_isler_tikirinda..._Dogalgaz_boru_hatti_anlasmasi_yil_sonuna_kadar_imzalanacak.html (accessed 9/102017)

In the 22nd World Oil Congress, which was hosted in Istanbul in July 2017 (9-13), the Turk and Israeli Ministers of Energy had the chance to meet and discuss about the project of a natural gas pipeline connecting Israel with Turkey at a cost of $2-4b. Yuval Steinitz disclosed that the framework agreement for the pipeline connecting the two countries will be signed before the end of the year (2017)[193]. Earlier in 2017 the General Director of the Israeli Ministry of Energy, Shaul Meridor, in his statement in the Atlantic Council Summit 2017 in Istanbul estimated that the Israeli natural gas can reach Turkey within the next two to three years[194].

From a technical point of view the construction of this pipeline would be easy given Israel's proximity to Turkey and in terms of cost it is attractive as it costs considerably less compared to East Med pipeline. However, it is doubtful whether any gas will be eventually delivered to Europe via this route given Turkey's energy needs. Energy demand in Turkey is expected to grow until 2030. As for natural gas consumption it will rise to 60-62 bcm per year in 2030, marking an increase of 1.7% from consumption in 2017[195]. This means that a marginal portion of Eastern Mediterranean's gas will reach the EU if the Turkey option is chosen given that domestic market in Turkey will absorb the bulk of exported natural gas if not all of it. If Israel seeks to strengthen its ties with the European Union, this fact should also be taken into account for choosing export route.

In terms of geopolitics there seems to be some serious problems. An Israel-Turkey pipeline would have to pass either through the EEZ of Cyprus or these of Lebanon and Syria. In the first case the problem lies in the perennial bilateral dispute between Cyprus and Turkey over the Cyprus issue and the refusal of Cyprus to accept a pipeline bypassing its EEZ which will end in Turkey. However, even though according to the International Law the approval of the coastal state is not required for other states to lay submarine pipelines

[193] Cumhuriyet (n.192)
[194] Al Jazeera Turk, 'Israil gazı 2-3 senede Türkiye'de olabilir', *Al Jazeera Turk*, 27 April 2017. Available from Al Jazeera Turk: http://www.aljazeera.com.tr/haber/israil-gazi-2-3-senede-turkiyede-olabilir (accessed 10/10/2017)
[195] Rzayeva G., 'Turkish natural gas demand decline', *Oxford Energy Forum,* Issue 110, August 2017, p. 11

or cables its consent for the route of the pipeline is necessary[196]. Therefore, the construction of this pipeline could be delayed on account of several excuses. Nevertheless, this problem does not seem to concern Israel given that the General Director of the Israeli Ministry of Energy has declared that the Cyprus issues does not hinder the project of a pipeline to Turkey[197]. Likewise, the alternative route of Lebanon and Syria poses problems since Israel and Lebanon have bilateral disputes, whereas the war situation in Syria raises security concerns for the implementation of the project.

On top of that, problems of domestic security in Turkey such as the Kurdish issue, terrorist attacks of ISIS its entanglement in the imbroglio of the Syrian civil war might be a hindrance. Moreover, Turkey has been following lately an authoritarian shift and tensions with the EU and especially Germany have been rising. Security and stability in the transit country is of paramount importance and there have been quite a few incidents of terrorist attacks on pipelines in Turkey's territory.

The latest development in Middle East with the recognition of Jerusalem as capital of Israel by the United States can cause serious tensions between Israel and Turkey[198]. While clashes have erupted in the Middle East and in Gaza a Palestinian has been shot dead by the Israeli forces[199], the Turkish President Erdogan exchanged accusation with the Israeli Prime Minister Netanyahu. Erdogan accused Israel of being a terrorist state murdering children, whereas Netanyahu replied that Turkey supports terrorists[200]. The Turkish President Recep Tayyip Erdogan a day before the recognition had threatened that such

[196] UNCLOS, Art. 58§1, 79§3

[197] Παλλάδος, Μ., 'Το Μπαρμπαρός δεν χαλά το Ισραήλ', *Η Σημερινή,* 14 June 2017. Available from: http://www.sigmalive.com/simerini/politics/427268/to-mparmparos-den-xala-to-israil (accessed 24/11/2017)

[198] BBC, 'Jerusalem is Israel's capital, says Donald Trump', BBC [website], 6 December 2017. Available from: http://www.bbc.com/news/world-us-canada-42259443 (accessed 6/12/2017)

[199] Naftemporiki, 'Γάζα: Παλαιστίνιος νεκρός από ισραηλινά πυρά στις διαδηλώσεις κατά Τράμπ', Naftemporiki [website], 8 December 2017. Available from: http://www.naftemporiki.gr/story/1302839/gaza-palaistinios-nekros-apo-israilina-pura-stis-diadiloseis-kata-tramp (accessed 10/12/2017)

[200] Touchtidou, S., 'Ερντογάν-Νετανιάχου: «Πόλεμος Δηλώσεων»', *Euronews* [website], 10 December 2017. Available from: http://gr.euronews.com/2017/12/10/erdogan-netaniaxou-polemos-diloseon?utm_term=Autofeed&utm_campaign=Echobox&utm_medium=Social&utm_source=Facebook#link_time=1512937840 (accessed 10/12/2017)

an act could go 'as far as cutting diplomatic relations with Israel'[201]. After the announcement of the recognition Turkey condemned the 'irresponsible statement of the US Administration' and called it to 'reconsider this faulty decision'. President Erdogan also called a summit of the Organization of Islamic Countries on 13th December 2017 for examining developments related to Jerusalem[202]. In the light of this development apart from the fact that doubts are raised whether the Turkish-Israeli rapprochement had been built on a stable basis, it seems quite difficult that the Israel-Turkey pipeline project could take head over the other options. Moreover, its reliability as a transit country is hurt. Certainly, it should be mentioned that investors are private companies. However, the geopolitical situation in the host country of an investment cannot be ignored especially when investments concern fixed infrastructure such as pipelines and their recoup period last long.

- *East Med Pipeline*

The East Med Pipeline is an offshore/onshore pipeline which is planned to transport offshore gas of the Levantine Basin (Israel, Cyprus) to Cyprus and Greece. In Greece it will be connected with the Poseidon pipeline, which will connect western Greece with Italy in Otranto, and thus gas will be transported to Italy. Apart from its interconnection with Poseidon, East Med will preliminary have exit points in Cyprus, Crete and Peloponnese. It will be extended in 1300 km offshore pipeline and 600 km onshore pipeline and its initial capacity will be 10 bcm/year rising to 16 bcm/year at full capacity. Additional 1 bcm/year will be channeled to domestic needs of Cyprus[203]. East Med has been included in the EU's list of Projects of Common Interest (PCI) as well as in the last Ten Years Development Plan

[201]Reuters, 'Turkey threatens to ax diplomatic ties with Israel if US recognizes Jerusalem as capital', Reuters [website], 6 December 2017. Available from: https://www.rt.com/news/411969-erdogan-jerusalem-israel-red-line/ (accessed 6/12/2017)
[202]Republic of Turkey Ministry of Foreign Affairs, No 378 Press Release regarding the Statement of the US Administration declaring that it recognizes Jerusalem as the capital of Israel and that it will move its Embassy in Israel to Jerusalem, 6 December 2017. Available from: http://www.mfa.gov.tr/no_-378_-abd-yonetiminin-kudusu-israilin-baskenti-olarak-tanidigi-ve-israildeki-buyukelciligini-kuduse-tasiyacagi-yonundeki-beyanati-hk_en.en.mfa (accessed 7/12/2017)
[203]East Med http://www.igi-poseidon.com/en/eastmed (accessed 19/11/2017)

and studies have shown that it is technically feasible and economically viable despite its technical difficulties and high cost[204].

Fig. 16 East Med Pipeline

Source: Edison

However, East Med is an ambitious project since it faces significant challenges. First of all, apart from its length, it will have to be laid across sea areas whose depth reaches 3,000m, especially south Crete. Few are the companies globally that could undertake successfully such an endeavor. Secondly, the cost of this project is estimated at €6.2 billion which limits the priority of the project given the fact that there are cheaper export options. Some also argue that market rationale does not warrant either this option. Nevertheless, the Head of the consortium which has undertaken the development of this project, Elio Ruggeri, assessed that given the estimated prices of natural gas in 2025 when the project is expected to deliver gas, East Med will be extremely competitive in that economic environment as well as one of the most competitive options for gas exports from the area

[204] East Med (n.203)

to the global natural gas market[205]. Another problem for the realization of this project is that the Israeli government will have to commit around 40-50% of Israel's export capacity only to this project[206], unless new reserves are discovered.

The geopolitical weaknesses of the Israel-Turkey pipeline could be East Med pipeline's advantages despite its really high cost. Cyprus and Greece in spite of the economic crisis are oases of security and stability neighboring with the inflammatory Middle East. The fact that both are Member States of the European Union adds up on their stability. At the same time the EU offers its support to this project by participating in the quadrilateral meetings concerning the project and by offering part of the money needed for the investment. The EU supports the project in order to diversify even more its supply routes. Turkey already serves as a transit country for natural gas to Europe thanks to TANAP pipeline and to TAP pipeline which is already under construction. Heading another route of natural gas to Turkey and through it to Europe does not reinforce European Union's energy security. If natural gas of Eastern Mediterranean is transported via Turkey, it will be like the EU is trying to reduce its dependence on Russia but on the other hand gathering all its alternatives in another country, Turkey, which has been facing security problems recently. Besides, the channeling of Eastern Mediterranean gas to the EU via two Member States would increase EU's leverage against Russia instead of Turkey's leverage[207]. Lastly, in case Israel chooses this export option it will strengthen its ties with the European Union, which is an opportunity for it to try to position itself not only as a Middle East country.

[205] Energypress, 'Ρουγκέρι: Στο περιβάλλον του 2020 ο EastMed θα είναι εξαιρετικά ανταγωνιστικός', energypress [website], 6 December 2017. Available from: https://energypress.gr/news/roygkeri-sto-perivallon-toy-2020-o-eastmed-tha-einai-exairetika-antagonistikos (accessed 6/12/2017)
[206] Tsakiris, T. (n.133)
[207] Tilliros, P., 'The role of East Med Gas in the European Security and the best Cyprus gas monetization option', Greek Energy Forum [website], 25 April 2017. Available from: https://www.greekenergyforum.com/publications/studies/2017/the-role-of-east-med-gas-in-the-european-energy-security-and-the-best-cyprus-gas-monetization-option/ (accessed 11/09/2017)

- *LNG Plant at Vasilikos, Cyprus*

The construction of an LNG Plant at Vasilikos in Cyprus is another option for exporting both Cypriot and Israeli gas given the proximity of Aphrodite and Leviathan fields. Israeli gas is necessary for the construction of the LNG Plant for the reason that Aphrodite's reserves alone are insufficient for an LNG facility, unless more reserves are discovered in Cyprus[208]. However, industry circles have raised concerns about the feasibility of such a project due to the small size of Vasilikos area ($2km^2$)[209]. The cost is also another problem if it is taken into consideration that it costs more than double than the Israel-Turkey pipeline, but it can be partially funded by the EU. Security reasons are another weakness of the project should serious tensions arise between Cyprus and Turkey, which has reacted intensely to the Cypriot offshore drills. The Vasilikos plant project has lost momentum in the export discussions.

- *LNG Plants in Israel*

LNG plants in Israel have been also suggested as an export option, with ports of Eilat, Ashkelon, Ashdod and Haifa as possible locations. However, there have been public protests against this option due to environmental concerns[210]. In the case of Eilat LNG tankers have a very limited space to manoeuvre due to the narrow passage of the Red Sea. Besides, an LNG plant close to touristic hubs of both Israel and Jordan is not preferred[211]. Security issues pose problems in this case as well. Energy facilities are often target of terrorist attacks and the Israel-Palestine conflict raises security concerns. Overall, the option of LNG plants in Israel has turned out to be difficult, however not dismissed.

[208] Tilliros, P. (n.207)
[209] Tagliapietra S. (n.139), p. 34
[210] Tagliapietra S. (n.139), p. 34
[211] Tagliapietra S. (n.139), p. 34

- *Exports to Egypt*

The discovery of the gigantic Zohr field revived the possibility of using the LNG plants at Idku and Damietta in Egypt, which have been sitting idle for a few years. The proximity of Leviathan, Aphrodite and Zohr fields allows their common development and the export of their gas through Egypt's LNG plants. Zohr field (Egypt) is only 90 km way from Aphrodite field (Cyprus) which is 7 km away from Leviathan field (Israel). Even though Leviathan field in Israel is located at equal distance both from Turkey and Egypt (500km from each), a pipeline to Turkey needs to be laid at deeper crossings making this option more expensive compared to a pipeline to Egypt. Hence, thanks to proximity economies of scale can develop which in turn can make viable the infrastructure of export facilities.

Cyprus actually is moving that way and its Minister of Energy, Lakkotrypis, has undertaken initiatives with the companies that operate Idku (Shell which also owns 35% of Aphrodite) and Damietta (Union Fenosa) in order to reach an agreement for exports of the Cypriot gas to Egypt[212]. The Cypriot sitting President Nikos Anastasiades also agreed with his Egyptian counterpart Abdel Fattah Al Sisi to start talks about the construction of a pipeline delivering natural gas from Aphrodite field to Egypt in a bilateral meeting in Cyprus on 20th November 2017[213].

[212] Energypress, 'Συναντήσεις Λακκοτρύπη με Shell και Fenosa για να πάει το αέριο της Αφροδίτης στα τερματικά της Αιγύπτου', *energypress.gr* [website], 22 November 2017. Available from: https://energypress.gr/news/synantiseis-lakkotrypi-me-shell-kai-fenosa-gia-na-paei-aerio-tis-afroditis-sta-termatika-tis (accessed 22/11/2017)

[213] Geropoulos, K., 'The meetings endorse a gas export pipeline from Cyprus to Egypt and the EastMed gas pipeline', *New Europe* [website], 24 November 2017. Available from: https://www.neweurope.eu/article/cyprus-greece-egypt-strive-export-east-med-gas-europe-price/ (accessed 7/12/2017).

The Ministry of Electricity of Egypt has also launched feasibility studies for an electricity interconnection between Egypt, Cyprus and Greece as part of a power linkage project between Africa and Europe -Egypt Today, 'Egypt studies power interconnection with Cyprus, Greece', *Egypt Today*, 20 November 2017. Available from: https://www.egypttoday.com/Article/3/33352/Egypt-studies-power-interconnection-with-Greece-Cyprus (accessed 29/11/2017)

Fig. 17 Distance of gas fields in Eastern Mediterranean

Source: ΤΕΚΜΩΡ

Despite security problems in Egypt which came violently to the front with the deadly terrorist attack at a mosque in Egypt in late November 2017, Tagliapietra argues that pipelines exporting Cypriot and Israeli gas to existing LNG plants in Egypt is the optimal solution not only because of the proximity but because the existent infrastructure saves millions of euros from anyhow costly energy infrastructure investments[214]. The existence

[214] Tagliapietra S. (n.139), p. 35

of disputes in Eastern Mediterranean deters investments in new projects making the exploitation of already existing infrastructure more reasonable.

1.4 Conclusion

Eastern Mediterranean gas will find its way to market in the mid-2020s. A considerable amount of this gas will be absorbed in domestic markets in the region. Israel's and even more Egypt's energy demand is on the rise. Israel has already been exporting gas to Jordan and will export more beginning in 2019-2020, whereas it has already authorized future gas exports to Gaza. Turkey as well is thirsty for energy. Its natural gas demand is expected to rise to 60-62 bcm in 2030, while at the same time the domestic production of natural gas is almost non-existent. There have been suggested several options for exporting Israel's and Cyprus natural gas and Israel's gas reserves are sufficient for two export projects at least. All of the alternatives have both strong and weak points. Geopolitical factors, economic cost, technical feasibility should be considered and of course gas buyers should be secured.

Geopolitical and security issues and economic cost seem to be the most serious concerns to be taken into account before investors decide the export options to be materialized. Netanyahu has mentioned that Israel's current gas capabilities can support two pipelines, one to Turkey and another to Egypt[215]. The pipeline line to Turkey turns out to become a weak option after the recent developments in Middle East and the accusations that leaders of Turkey and Israel exchanged. In spite of some security concerns the option of Egypt seems to be the optimal choice at present given its proximity to natural gas fields and the existent LNG infrastructure in Egypt which will low the exploitation cost. This is also protested by Cyprus's mobilization to export its gas to Egypt. East Med is also a good option if security reasons and political stability were the deciding factors. The cost of this project is quite high, but the European Union is willing to cover part of it. Notwithstanding

[215] Keinon, H., 'Gas pipeline focus of 'historic' talks between Israeli, Greek and Cypriot leaders', Jerusalem Post, 28 January 2016. Available from: http://www.jpost.com/Israel-News/Politics-And-Diplomacy/Gas-pipeline-focus-of-historic-talks-between-Israeli-Greek-and-Cypriot-leaders-443120 (accessed 10/12/2017)

the fact that originally this projects was considered unlikely its chances have been raised recently, but still it is not the first option. The other options of LNG plants in Cyprus and Israel have long stopped to be considered possible. Altogether, with the present data the option of exports to Egypt projects is the optimal solution and given that Israel's natural gas capacity can support two export projects East Med has improved its chances to materialize.

Conclusions

The discussion about energy security as an issue of national importance and dates back to the eve of the Word War I when Winston Churchill, then First Lord of the Admiralty of the British Empire, decided to swift the energy source of the British navy from coal to oil. This meant that the British Empire would give up on its indigenous coal resources to start import oil from foreign countries. Originally, energy security was identified with security of fuels supplies for the arm forces but the modern concept of energy security has expanded to embrace knowledge from several disciplines.

In the beginning International Relations and Political Science was the analytical framework for energy security and the main concern was who and by what means was controlling energy resources. The oil crises in the 1970's led states to start exploring new resources such as gas and renewables and securing the efficiency of their energy system. Thus, knowledge from natural sciences and engineering found their way in energy security discourse through the robustness perspective. In the 1980's - 1990's the robustness perspective gave way to the resilience perspective which analyzed energy security through the scope of economics and complex system analysis. This perspective contended that market rules could prove more efficient in securing energy flows and inserted in the concept of energy security economic terms such as affordability of energy price.

Contemporary energy security studies suggest an inclusive approach to the concept encompassing knowledge from all the above-mentioned fields and also connecting this knowledge with policy issues such as climate change. There have been proposed quite a few definitions of energy security, whereas there are also opinions claiming that the concept of energy security is 'slippery' and 'elusive. Contemporary researchers have proposed different dimensions to define energy security such as availability, affordability, stewardship, efficiency, environmental and social sustainability, technology development, regulation and governance, but they can all be boiled down to the four

dimensions proposed by APERC. Availability, accessibility, affordability and acceptability have been called the four As.

Availability describes the physical existence of energy resources in a country and the ability of a country to supply energy resources in case it lacks indigenous ones. Accessibility is a country's ability to reach the available resources overcoming any kind of barriers and the resilience of the entire energy system. Affordability refers to the economic cost of energy supplies, whereas environmental and social concerns about energy production and use are expressed with the term acceptability.

For conceiving energy security correctly these dimensions should be examined in parallel since they are interlinked. Even though availability has been studied more, the importance of the other three dimensions should not be downgraded. For instance, technological developments may allow in the future access to energy resources not recoverable presently, thus improving accessibility and consequently availability.

As for the measurement of these dimensions there have been proposed numerous indicators, some of the simple, while others complex. Production rations, import dependency, energy price, political stability in a state, carbon fuels-free energy portfolio of a country, environmental footprint of energy activities are some of the most common indicators for measuring energy security. In addition, the spatial and temporal dimension should be taken into account in the energy security concept. Lastly, it should be mentioned that energy security's meaning varies across countries whether they are producer or consumer countries.

One could conclude that energy security is a concept that varies according to dimensions, across countries and over times. However, energy security is one concept with multiple aspects. These aspects are simply different instances of energy security under different conditions.

As far as energy security of the European Union is concerned the first thing that comes into mind is diversification; diversification of suppliers, of energy mix and of routes. Diversification is first related with the dimension of availability. European Union is

relatively poor in domestic energy resources which have started recently being depleted. In particular, its domestic gas production has reduced due to the significant shrinkage of production and the Netherlands. That means that it has to import energy to satisfy its energy needs. It imports slightly more than a half of its energy needs and with regards to natural gas it satisfies its need by supplying almost 70% of them and from that about 40% comes from a non-EU country, Russia. The Union is heavily dependent on Russia not only for natural gas supplies, but for oil as well. Russia is the first exporter of energy resources to European Union. However, even though at first sight it seems that all Member States are heavily dependent on Russia for gas, this is not the case.

There are Member States that are not exposed to Russian dependency, whereas there are others which are absolutely dependent on Russian gas. The Baltic States, Finland, Central European states and Bulgaria are extremely dependent on a single supplier, Russia. Greece as well is quite exposed to Russian dependency. These countries are exposed to Russia in case of natural gas supplies not only because Russia is the only supplier, but because they lack interconnection facilities with other Member States and LNG facilities which could mitigate their energy vulnerability. LNG also serves the acceptability dimension of energy security since its environmental footprint is smaller compared to oil and other solid fuels.

The European Commission and the European Union in general have realized the danger that the Union faces in terms of supplies and have issued several documents and initiatives for diversifying its energy suppliers and routes. Diversification of external supplies and related infrastructure was a clear goal of the European Energy Security Strategy launched in 2014, which also suggested the creation of a natural gas hub in South East Europe. Not only availability will be enhanced via these goals but also accessibility. These goals were also part of the first dimension of the Energy Union, which added LNG as a means of diversification.

Eastern Mediterranean after the recent discoveries of natural gas deserves can serve European Union's diversification goal by diversifying suppliers and routes and linkage to

the Southern Gas Corridor and by contributing to the creation of an energy hub. Nevertheless, natural gas reserves of Cyprus and Israel cannot be a game changer for the Union's energy security. When exports finally take place only a limited amount of the will reach European Union which correspond to a minimal percentage of the European Union's energy needs overall. Those which will benefit more from Eastern Mediterranean's gas reserves are Member States in South Europe and some in Central Europe depending on the export route which will be finally chosen. Cyprus will absolutely enhance its energy security which is quite problematic given it is an energy island. In case East Med Pipeline is constructed Greece and Italy will certainly improve their energy indicators not only thanks to diversification of suppliers and routed but also thanks to construction of new energy infrastructure. Similarly, in case LNG options materializes Greece and Bulgaria will benefit as well as Hungary and Slovakia since they can be supplied with gas via interconnectors with Bulgaria.

But in order for European Union to improve its energy security thanks to Eastern Mediterranean's natural gas it is required that this gas starts flowing to the Union. There are several alternatives for exporting Cyprus's and Israel's natural gas for which investors should evaluate several aspects before choosing one. Energy projects such as pipelines or LNG facilities include construction of high-cost infrastructure for the extraction, treatment and transport of natural gas. Investors of natural gas pipelines and LNG facilities usually decide on a 20-year time horizon due to the huge cost of such investments and the long period that their recoup lasts. That means that the partnership will last long and that companies involved should uphold contracts. Concerned states usually sign intergovernmental agreements embracing the investment projects. As a result decisions about energy investments are not based only on economic and technical criteria, but relations among states should be stable and without tensions.

As Brenda Shaffer argues

"energy trade reflects existing peaceful relations; […] Close political cooperation generally precedes the establishment of pipeline infrastructure between countries. Companies may stay in a region if conflict emerges after they have made investments, but

few companies will initiate exploration in hot conflict zones. Intergovernmental agreements are necessary to support commercial agreements on international gas pipelines, and banks will rarely fund new investments in active conflict zones"[216].

Eastern Mediterranean is a region suffering from conflicts between states, whereas there are latent tensions which can burst at any time. The Syrian civil war, the dispute between Israel and Lebanon, general instability in Middle East after the Arab Spring, the Palestinian-Israeli conflict and Turkey's drift to authoritarianism and unpredictability all compose an inflammatory political mix. Tensions between Palestine and Israel have already resurged after the United States recognized Jerusalem and clashes have erupted between Palestinians and Israelis in the West Bank and Gaza Strip. Within this scenery Cyprus and Greece emerge as security and stability oases despite the problems that the economic crisis has caused. East Med would certainly be the best choice for the European Union but it is not the one that decides about the export option. Given the present situation exports to Egypt's LNG existing infrastructure is the most possible export route. The low economic cost because of the already existing infrastructure can counterbalance security concerns, which are not so high. The next best option would be East Med which involves the most prosperous country in the region, Israel, and the most stable countries in the region, Greece and Cyprus, which happen to be Members of the European Union offering that more security guarantees, both from geopolitical aspect and investment financing.

On the whole, deciding on energy investments is a difficult task which demands evaluating a lot of factors, often conflicting with each other. No matter which export option will finally materialize European Union will benefit from East Mediterranean's gas reserves in terms of energy security and especially of diversification. Other options are more beneficial for the EU, whereas other less. In any respect Eastern Mediterranean with the

[216] Shaffer, B. (2014) cited in Tagliapietra, S. (n.139), p. 47

current discoveries is not a game changer for the EU but it will simply contribute to its energy security.

BIBLIOGRAPHY

English bibliography

Agdemir, A. M., 'A new partnership in the Eastern Mediterranean', *Mediterranean Quarterly*, vol. 26, no. 4, 2015, p. 49-68

Agdemir, A. M., 'Relations between Israel and the South Cyprus Greek Administration: A new alignment in the Eastern Mediterranean?', *Perceptions,* vol. 21, no. 2, Summer 2016, pp. 103-126

Ang, B.W., Choong, W.L., Ng, T.S., 'Energy security: Definitions, dimensions and indexes', *Renewable and Sustainable Energy Reviews*, vol. 42, 2015, pp. 1077-1093

APERC, *A quest for energy security in the 21st century. Resources and constrains*, Asia Pacific Energy Research Centre, 2007

Azran, E., 'The biggest-ever infrastructure project in Israel get under way, *Haaretz,* 27 February 2017. Available from: https://www.haaretz.com/israel-news/1.774036 (accessed 2/11/2017)

Arınç, I. S.- Özgül, L., 'Exploration of EastMed gas resources: Is it possible without Turkey?', *Insight Turkey*, vol. 17, no. 2, 2015, pp. 117-140

Athanassopoulou, E., 'Responding to a challenge: Greece's new policy towards Israel', *Southeast European and Black Sea Studies,* vol. 1, no. 1, 2003, pp. 108-125

Austvik, O. G., 'The EU Energy Union, energy security and Russian gas', M-RCBG Associate Working Paper Series, no. 51, Mossavar-Rahmani Center for Business & Government, Harvard Kennedy School, December 2015

Azran, E., 'The biggest-ever infrastructure project in Israel get under way, *Haaretz,* 27 February 2017. Available from: https://www.haaretz.com/israel-news/1.774036 (accessed 2/11/2017)

Baker, L., 'How gas could warm relations between Israel and Turkey', *Reuters,* 20 June 2016. Available from Reuters: http://www.reuters.com/article/us-israel-turkey-gas-insight/how-gas-could-warm-relations-between-israel-and-turkey-idUSKCN0Z60WJ (accessed 10/10/2017)

Balcı, A.- Kardaş, T., 'The changing dynamics of Turkey's relations with Israel: An analysis of securitization', *Insight Turkey,* vol. 14, no. 2, 2012, pp. 99-120

Baldwin, D.A., 'The concept of security', *Review of International Studies*, vol. 23, 1997, pp. 5-26

BBC, 'Jerusalem is Israel's capital, says Donald Trump', BBC [website], 6 December 2017. Available from: http://www.bbc.com/news/world-us-canada-42259443 (accessed 6/12/2017)

Biresselioglu, M. E., *European Energy Security. Turkey's future role and impact*, Palgrave Macmillan, 2011

Borger, J., 'Turkey confirms it barred Israel from military exercise because of Gaza War', *The Guardian,* 12 October 2009. Available from: https://www.theguardian.com/world/2009/oct/12/turkey-israel-military-gaza (accessed 9/11/2017)

BP Statistical Review of World Energy, June 2016

Brown, M.A., Wang, Y., Sovacool, B. K., D'Agostino, A. L., ' Forty years of energy security trends: A comparative assessment of 22 industrialized countries', *Energy Research and Social Science,* vol. 4 December, 2014, pp. 64-77

Bruegel Belgium, *The impact of BREXIT on the EU energy system,* European Parliament-Directorate General for Internal Policies, November 2017

Cherp, A. & Jewell, J., 'The three perspectives on energy security: intellectual history, disciplinary roots and the potential for integration', *Current Opinion in Environmental Sustainability,* vol. 3, no. 4, 2011, pp. 202-2012

Cherp, A. & Jewell, J., 'The concept of energy security: Beyond the four As', *Energy Policy,* vol. 75, 2014, pp. 415-421

Chester, L., 'Conceptualizing energy security and making explicit its polysemic nature', *Energy Policy,* vol. 38, no. 2, 2010, pp. 887-895

Chyong, Ch., Cherneva, V., 'Europe's vulnerability on Russian gas, European Council on Foreign Relations- *ecfr.eu* [website], 17 March 2015. Available from: http://www.ecfr.eu/article/commentary_europes_vulnerability_on_russian_gas (accessed 2/12/2017)

Commissioner Aries Canete in Israel for East Med Energy Summit, *ec.europa.eu* [website], 3April 2017. Available from https://ec.europa.eu/energy/en/news/commissioner-arias-ca%C3%B1ete-israel-eastmed-energy-summit (accessed 23/10/2017)

Dellek Drilling, Tamar Gas Field, *dellekdrilling.co.il* [website], Available from: http://www.delekdrilling.co.il/en/project/tamar-gas-field (accessed 2/11/2017)

East Med http://www.igi-poseidon.com/en/eastmed (accessed 19/11/2017)

Egypt Today, 'Egypt studies power interconnection with Cyprus, Greece', *Egypt Today*, 20 November 2017, Available from: https://www.egypttoday.com/Article/3/33352/Egypt-studies-power-interconnection-with-Greece-Cyprus (accessed 29/11/2017)

Euractiv, 'Consortium declares Cyprus gas find commercially viable', *Euractiv* [website], 8 June 2015. Available from: http://www.euractiv.com/section/energy/news/consortium-declares-cyprus-gas-find-commercially-viable/ (accessed 9/11/2017)

European Commission, 2030 Energy Strategy, *europa.eu* [website], Available from: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2030-energy-strategy (28/10/2017)

European Commission, 'Gas and oil supply routes', *europa.eu* [website]. Available from: https://ec.europa.eu/energy/en/topics/imports-and-secure-supplies/gas-and-oil-supply-routes (accessed 18/11/2017)

European Commission, ‘Green Paper ‘Towards a European strategy for the security of energy supply’ COM (2000) 769 final

European Commission, ‘Second Strategic Energy Review-An EU Energy Security and Solidarity Action Plan’ COM (2008) 781 final, p.3

European Commission, ‘Security of energy supply and international cooperation-The EU Energy Policy: Engaging with Partners beyond Our Borders’, COM (2011) 539 final, p. 3

European Commission, ‘In-depth study of European Energy Strategy accompanying the document Communication from the Commission to the Council and the European Parliament: European Energy Security Strategy COM(2014) 330 final ’ SWD(2014) 330 final/3(a)

European Commission, ‘European Energy Security Strategy’, COM (2014) 330 final (b)

European Commission, ‘A policy framework for climate and energy in the period from 2020 to 2030’ COM (2014) 15 final (c)

European Commission, ‘A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy’ COM (2015) 80 final

European Commission, ‘Staff Working Document on the European Energy Security Strategy’ SWD(2015) 404 Final

European Commission, ‘Second Report on the State of the Energy Union’ COM (2017) 53 final

European Commission, ‘EU strategy on liquefied natural gas and gas storage’, COM (2016) 49 final

European Commission Daily news [website], 31 March 2017. Available from http://europa.eu/rapid/press-release_MEX-17-825_en.htm 23/10/2017 (accessed 23/10/2017)

European Commission-Fact Sheet, 'Liquefied natural gas and gas storage will boost EU's energy security,' *europa.eu* [website], 16 February 2016. Available from: http://europa.eu/rapid/press-release_MEMO-16-310_el.htm (25/11/2017)

Eurostat (a), 'Energy production and imports', *Eurostat* [website], June 2017. Available from:http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_production_and_imports (accessed 24/10/2017)

Eurostat (b), 'Consumption of Energy', *Eurostat* [website], June 2017. Available from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Consumption_of_energy (accessed 24/10/2017)

Eurostat (c), 'EU imports of energy products-recent developments', *Eurostat* [website], April 2017. Available from: http://ec.europa.eu/eurostat/statistics-explained/index.php/EU_imports_of_energy_products_-_recent_developments (accessed 25/10/2017)

EU Energy in figures. Statistical pocketbook 2016, Luxembourg, Publications Officer of the European Union, 2016

Fischhendler, I.-Nathan, D., 'In the name of energy security: the struggle over the exportation of Israeli natural gas', *Energy Policy,* vol. 70, 2014, pp.152-162

Flaherty, Ch. & Leal Filho, W., 'Energy security as a subset of national security' in Leal Filho, W. & Voudouris, V. (eds), *Global Energy and security,* London, Springer, 2013, pp. 11-25

Galczynski, M., Ruszel, M., Turowski, P., Zajdler, R, Zawisza, A., *Global LNG Market,* Warsaw, Ignacy Lukasiewicz Energy Policy Institute, 2017. Available from: http://www.instytutpe.pl/wp-content/uploads/2017/05/Global-LNG-Market_e-book4.pdf (accessed 30/11/2017)

Gas Infrastructure Europe, 'LNG Map 2016'. Available from: http://www.gie.eu/download/maps/2016/GIE_LNG_2016_A0_1189x841_FULL.pdf (accessed 27/11/2017)

Geropoulos, K., 'The meetings endorse a gas export pipeline from Cyprus to Egypt and the EastMed gas pipeline', *New Europe* [website], 24 November 2017. Available from: https://www.neweurope.eu/article/cyprus-greece-egypt-strive-export-east-med-gas-europe-price/ (accessed 7/12/2017)

Girit, S. '5 soruda Türkiye-İsraeli ilişkileri neden normalleşti?', *BBC Türkçe,* 19 October 2016. Available from BBC Türkçe: http://www.bbc.com/turkce/haberler-turkiye-37703220 (accessed 9/10/2017)

Globes, 'Israel, Cyprus, Greece mull energy corridor', *Globes* [website], 8 November 2012. Available from: http://www.globes.co.il/en/article-1000797089 (accessed 6/12/2017)

Globes, 'Israeli gov't to allow Leviathan gas sales to Gaza', *Globes* [website], 3 March 2016. Available from: http://www.globes.co.il/en/article-israeli-govt-to-allow-gas-exports-from-leviathan-to-gaza-1001108009 (accessed 19/11/2017)

Globes, 'Energean doubles estimates for Karish, Tanin gas reserves, *Globes* [website], 2 November 2017. Available from: http://services.globes.co.il/en/article-energean-doubles-estimates-for-karish-tanin-gas-reserves-1001210170 (accessed 4/11/2017)

Graefe, L. 'The peak oil debate', *Economic Review Federal Reserve Bank of Atlanta,* vol. 94, 2009

Grigoriadis, I. N., 'Energy discoveries in the Eastern Mediterranean: conflict or cooperation?', *Middle East Policy,* vol. 21, no. 3, 2014, pp. 124-133

Grygiel, J. J., *Great Powers and geopolitical change*, The John Hopkins University Press, 2006

Guzansky, Y., 'Israel's periphery doctrine 2.0: the Mediterranean plus', *Mediterranean Politics,* vol. 19, no.1, pp. 99-116

Hasan, A., 'Türkiye-İsrail ilişkileri bugün resmen normalleşti', Miliyet.com.tr, 5 December 2016. Available from Miliyet.com.tr http://www.milliyet.com.tr/turkiye-israil-iliskileri-bugun-siyaset-2356427/ (accessed 9/10/2017)

Hughes, L., 'The four 'R's of energy security, *Energy Policy*, vol. 37, no. 6, 2009, pp. 2459-2461

Jefferson, M., 'Closing the gap between energy research and modelling, the social sciences and modern realities', *Energy Research & Social Science*, vol. 4, 2014, pp.42-52

Johansson, B., 'A broadened typology on energy and security' *Energy,* vol. 53 May, 2013, pp. 199-205

Israeli Ministry of Energy, 'Israel's export options'. Available from: http://www.energy-sea.gov.il/English-Site/Pages/Oil%20And%20Gas%20in%20Israel/Israels-Export-Options.aspx (accessed 17/11/2017)

Israel Ministry of Foreign Affairs, 'President Peres meets with President of Cyprus Christofias', 14 March 2011. Available from: http://mfa.gov.il/MFA/PressRoom/2011/Pages/President_Peres_meets_President_Cyprus_14-Mar-2011.aspx (accessed 6/11/2017)

Kantouris, C., 'Netanyahu in Greece: Med pipeline would be 'revolution', *The times of Israel*, 15 June 2017, Available from The Times of Israel: https://www.timesofisrael.com/netanyahu-in-greece-med-pipeline-would-be-revolution/ (accessed 15/10/2017)

Keinon, H., 'Gas pipeline focus of 'historic' talks between Israeli, Greek and Cypriot leaders', Jerusalem Post, 28 January 2016. Available from: http://www.jpost.com/Israel-News/Politics-And-Diplomacy/Gas-pipeline-focus-of-historic-talks-between-Israeli-Greek-and-Cypriot-leaders-443120 (accessed 10/12/2017)

Keohane, R. O. & Nye, J., *Power and Interdependence*, 2nd edn, USA, Scott, Foresman and Company, 1989

Keppler, J. H., *International relations and security of supply: risks to continuity and geopolitical risks*, Brussels, European Parliament-Directorate General for External Policies of the EU, 2017

Kruyt, B., Van Vuuren, D.P., De Vries, H.J.M., Groenenberg, H., 'Indicators for energy security', *Energy Policy,* vol. 37, 2009, pp. 2166-2181

Levey, Z., 'Israel's entry into Cyprus, 1959-1963: Diplomacy and strategy in the Eastern Mediterranean', *Middle East Review of International Affairs*, vol. 7, no.3, 2003, pp. 73-87

LNG World News, 'Cyprus inks MoU for LNG project with Delek, Noble and Avner', *LNG World News* [website], 26 June 2013. Available from: http://www.lngworldnews.com/cyprus-inks-mou-for-lng-project-with-delek-noble-and-avnear/ (9/11/2017)

McCain, J., 'Extraordinary foresight made Winston Churchill great', *Telegraph,* 20 March 2008. Available from: http://www.telegraph.co.uk/culture/books/3671962/John-McCain-Extraordinary-foresight-made-Winston-Churchill-great.html (accessed 17/11/2017)

Molnar, G., Behrens, A., Egenhofer, Ch., Genoese, F., 'Europe's LNG Strategy in the wider EU gas market', Center for European Policy Studies Policy Brief, no. 333, October 2015

Murinson, A., 'Strategic realignment and energy security in the Eastern Mediterranean', BESA Centre Perspectives Paper, no. 159, 9 January 2012

Noble Energy New Release, 'Noble energy announces agreement to sell Tamar gas to multiple customers to Jordan', *Noble Energy* [website], 19 February 2014. Available from: http://investors.nblenergy.com/releasedetail.cfm?ReleaseID=826568 (accessed 18/11/2017)

Offshore, 'Gas reserves increase at Aphrodite offshore Cyprus', *Offshore* [website], 26 November 2014. Available from: http://www.offshore-mag.com/articles/2014/11/gas-reserves-increase-at-aphrodite-offshore-cyprus.html (accessed 2/11/2017)

Paraskova, T., 'Israel just started exporting natural gas to Jordan', *oilprice.com* [website], 2 March 2017. Available from: https://oilprice.com/Latest-Energy-News/World-News/Israel-Just-Started-Exporting-Natural-GasTo-Jordan.html (accessed 16/11/2017)

Pirani, S., Stern, J. & Yafimava, K., *The Russian-Ukrainian gas dispute of January 2009: a comprehensive assessment*, Oxford Institute for Energy Studies, 2009

Protopapas, G., 'Israel and Greece: A dynamic alliance in Eastern Mediterranean', Research Institute for European and American Studies Brief, 15 January 2012. Available from: http://rieas.gr/images/george.pdf (accessed 15/10/2017)

Ren, J., Sovacool, B. K., 'Quantifying, measuring and strategizing energy security: Determining the most meaningful dimensions and metrics, *Energy*, vol. 76, no. 1, 2014, pp. 838-849

Republic of Turkey Ministry of Foreign Affairs, No 378 Press Release regarding the Statement of the US Administration declaring that it recognizes Jerusalem as the capital of Israel and that it will move its Embassy in Israel to Jerusalem, 6 December 2017. Available from: http://www.mfa.gov.tr/no_-378_-abd-yonetiminin-kudusu-israilin-baskenti-olarak-tanidigi-ve-israildeki-buyukelciligini-kuduse-tasiyacagi-yonundeki-beyanati-hk_en.en.mfa (accessed 7/12/2017)

Reuters, 'Update 2-Israel's Leviathan gas to supply Jordan in $10bln deal', *reuters.com* [website], 26 September 2016. Available from: http://www.reuters.com/article/israel-gas-jordan/update-2-israels-leviathan-gas-to-supply-jordan-in-10-bln-deal-idUSL8N1C22N1 (accessed 16/11/2017)

Reuters, 'Partners in Israel's Tamar raise gas reserves estimates by 13pct', *Reuters*, 2 July 2017. Available from: https://www.reuters.com/article/israel-natgas/partners-in-israels-tamar-raise-gas-reserves-estimate-by-13-pct-idUSL8N1JT09K (accessed 2/11/2017)

Reuters, 'Turkey threatens to ax diplomatic ties with Israel if US recognizes Jerusalem as capital', Reuters [website], 6 December 2017. Available from:

https://www.rt.com/news/411969-erdogan-jerusalem-israel-red-line/ (accessed 6/12/2017)

Rzayeva G., 'Turkish natural gas demand decline', *Oxford Energy Forum,* Issue 110, August 2017, pp.8-11

Shaffer, B., 'Natural gas supply stability and foreign policy', *Energy Policy,* vol. 56, 2013, pp. 114-125

SigmaLive, 'Cyprus-Israel to strengthen defence cooperation', *SigmaLive* [website], 24 February 2016. Available from: http://www.sigmalive.com/en/news/politics/142017/cyprusisrael-to-strengthen-defence-cooperation (accessed 17/11/2017)

Sovacool, B. K. & Mukherjee, I., 'Conceptualizing and measuring energy security: A synthesized approach', *Energy*, vol. 36, no. 8, 2011, pp. 5343-5355

Stavri, G., 'The new energy triangle (NET) of Cyprus-Greece-Israel: casting a net for Turkey?!', *rieas.gr* [website]. Available from: http://www.rieas.gr/images/stavri12.pdf (accessed 10/9/2017)

Stergiou, A., 'Turkey's Neo-Ottoman policy and the Greece-Cyprus-Israel axis. Historical and geopolitical parameters, *Thetis,* vol. 20, 2013, p. 491-492

Stern, J., *The Russian-Ukrainian gas crisis of January 2006*, Oxford Institute for Energy Studies, 2006

Tagliapietra, S. (a), 'Towards a new Easter Mediterranean energy corridor? Natural gas developments between market opportunities and geopolitical risks', Nota di Lavoro-Fondazione Eni Enrico Mattei, 12/2013

Tagliapietra, S. (b), *Energy: a shaping factor for regional stability in the Eastern Mediterranean?,* European Parliament-Directorate General for External Policies, 2017

Tagliapietra, S. (c), *Energy relations in the Euro-Mediterranean. A Political Economy perspective*, Palgrave Macmillan, 2017

The history of Zohr, *eni.com* [website]. Available from https://www.eni.com/en_IT/operations/upstream/exploration-model/zohr-egypt.page (accessed 1/11/2017)Talus, K., *Introduction to EU Energy Law,* Oxford University Press, 2016

The Times of Israel, 'Leviathan fields reserves 20% smaller than reported', *The Times of Israel,* 5 June 2016. Available from: https://www.timesofisrael.com/leviathan-field-reserves-20-smaller-than-reported/ (accessed 2/11/2017)

The Times of Israel, 'Work on Israel-Cyprus-Greece electricity link to start in 2018', *The Times of Israel,* 17 October 2017. Available from: https://www.timesofisrael.com/work-on-israel-cyprus-greece-electricity-link-to-start-2018/ (accessed 17/10/2017)

The Times of Israel, 'After fires Israel teams with Greece, Cyprus from emergency force', *The times of Israel*, 8 December 2016. Available from: https://www.timesofisrael.com/after-fires-israel-teams-with-greece-cyprus-for-emergency-force/ (accessed 1/11/2017)

The UfM Energy platforms, *Union for the Mediterranean* [website]. Available from: http://ufmsecretariat.org/the-ufm-energy-platforms/ (accessed 1/11/2017)

Tilliros, P., 'The role of East Med Gas in the European Security and the best Cyprus gas monetization option', Greek Energy Forum [website], 25 April 2017. Available from: https://www.greekenergyforum.com/publications/studies/2017/the-role-of-east-med-gas-in-the-european-energy-security-and-the-best-cyprus-gas-monetization-option/ (accessed 11/09/2017)

Trading Economics (a), 'Cyprus imports by country', *Trading Economics* [website]. Available from: https://tradingeconomics.com/cyprus/imports-by-country (accessed 5/11/2017)

Trading Economics (b), Cyprus exports by country, *Trading Economics* [website]. Available from: https://tradingeconomics.com/cyprus/exports-by-country (accessed 5/11/2017)

Tsakiris, T., *Greece and the energy geopolitics of the Eastern Mediterranean*, LSE Ideas Strategic update 14.1., June 2014

Tziampiris, A., *The Emergence of Israeli-Greek Cooperation,* Springer, 2015

Tziarras, Z., 'The new geopolitical landscape in the Eastern Mediterranean: the Israeli perception', *Eastern Mediterranean Geopolitical Review,* vol. 1, Fall 2015, p. 32-43

Tusk, D., 'A united Europe can end Russia's energy stranglehold', *Financial Times, 21* April 2014. Available from: https://www.ft.com/content/91508464-c661-11e3-ba0e-00144feabdc0?mhq5j=e5 (accessed 15/10/2017)

Ulutaş, U., *Turkey-Israel: A fluctuating alliance*, SETA Policy Brief no. 42, January 2010

U.S. Geological Survey (a)*, Assessment of undiscovered oil and gas resources of the Levant Basin province, Eastern Mediterranean,* Fact sheet 2010-3014, March 2010

U.S. Geological Survey (b), *Assessment of undiscovered oil and gas resources of the Nile Delta Basin province, Eastern Mediterranean*, Fact sheet 2010-3027, May 2010

Yergin, D., 'Ensuring energy security'*, Foreign Affairs,* vol. 85, no.2, 2006, pp. 69-82

Yergin, D., 'What does 'Energy Security' really mean?, *Wall Street Journal,* 11 July, 2006, p.A. 12

Winzer, Ch., 'Conceptualizing energy security', *Energy Policy*, vol. 46, 2012, pp. 36-48

Zeigher, A., 'Israel, Greece, Cyprus sign energy and water deal', Times of Israel, 8 August 2013. Available from: https://www.timesofisrael.com/israel-greece-cyprus-sign-energy-and-water-deal/ (accessed 14/11/2017)

Turkish Bibliography

Al Jazeera Turk, 'Israil gazı 2-3 senede Türkiye'de olabilir', *Al Jazeera Turk*, 27 April 2017. Available from Al Jazeera Turk: http://www.aljazeera.com.tr/haber/israil-gazi-2-3-senede-turkiyede-olabilir (accessed 10/10/2017)

Bakır, B., 'Dünden bugüne Türkiye-İsrail ilişkileri', *Habertürk,* 5 July 2016. Available from Habertürk: http://www.haberturk.com/yazi-dizisi/haber/1262938-dunden-bugune-turkiye-israil-iliskileri (accessed 10/10/2017)

Cumhuriyet, 'İsrail ile işler tıkırında. Doğalgaz boru hattı anlaşması yıl sonuna kadar imzalanacak', *Cumhuriyet*, 13 July 2017. Available from Cumhuriyet: http://www.cumhuriyet.com.tr/haber/turkiye/780106/israil_ile_isler_tikirinda..._Dogal_gaz_boru_hatti_anlasmasi_yil_sonuna_kadar_imzalanacak.html (accessed 9/102017)

Girit, S. '5 soruda Türkiye-İsraeli ilişkileri neden normalleşti?', *BBC Türkçe,* 19 October 2016. Available from BBC Türkçe: http://www.bbc.com/turkce/haberler-turkiye-37703220 (accessed 9/10/2017),

Hasan, A., 'Türkiye-İsrail ilişkileri bugün resmen normalleşti', Miliyet.com.tr, 5 December 2016. Available from Miliyet.com.tr http://www.milliyet.com.tr/turkiye-israil-iliskileri-bugun-siyaset-2356427/ (accessed 9/10/2017)

Greek bibliography

Διψήφια αύξηση το 2017 στις τουριστικές αφίξεις από το Ισραήλ-Σημαντικές επαφές της Υπουργού Τουρισμού κας 'Ελενας Κουντουρά στο Τελ Αβίβ με τον Ομόλογό της και τουριστικούς πράκτορες για τη δυναμική προώθηση του ελληνικού τουρισμού', *Υπουργείο Τουρισμού-Ελληνικός Οργανισμός Τουρισμού* [website], 9 February 2017. Available from: http://www.gnto.gov.gr/el/09022017-%CE%B4%CE%B9%CF%88%CE%AE%CF%86%CE%B9%CE%B1-%CE%B1%CF%8D%CE%BE%CE%B7%CF%83%CE%B7-%CF%84%CE%BF-2017-%CF%83%CF%84%CE%B9%CF%82-%CF%84%CE%BF%CF%85%CF%81%CE%B9%CF%83%CF%84%CE%B9%CE%BA%CE%AD%CF%82-%CE%B1%CF%86%CE%AF%CE%BE%CE%B5%CE%B9%CF%82-%CE%B1%CF%80%CF%8C-%CF%84%CE%BF-%CE%B9%CF%83%CF%81%CE%B1%CE%AE%CE%BB-

%CF%83%CE%B7%CE%BC%CE%B1%CE%BD%CF%84%CE%B9%CE%BA%CE%AD%CF%82-%CE%B5%CF%80%CE%B1%CF%86%CE%AD%CF%82-%CF%84%CE%B7%CF%82

Μητρόπουλος, Δ., 'Η αναθέρμανση σχέσεων Ελλάδας-Ισραήλ', Το Βήμα, 14 May 2000. Available from: http://www.tovima.gr/relatedarticles/article/?aid=122201 (accessed 6/11/2017)

Κοιλάκος, Δ., 'ΡΑΕ και ΡΑΕΚ άναψαν πράσινο φως για την πρόοδο του EuroAsia Interconnector, energypress.com [website], 17 October 2017. Available from https://energypress.gr/news/rae-kai-raek-anapsan-prasino-fos-gia-tin-proodo-toy-euroasia-interconnector (accessed 17/10/2017)

Κούμας, Μ., 'Η ίδρυση του κράτους του Ισραήλ', *Καθημερινή,* 5 July 2012. Available from Kathimerini.gr: http://www.kathimerini.gr/449654/article/epikairothta/kosmos/h-idrysh-toy-kratoys-toy-israhl (accessed 12/10/2017) (in Greek)

Παλλάδος, Μ., 'Το Μπαρμπαρός δεν χαλά το Ισραήλ', *Η Σημερινή,* 14 June 2017. Available from: http://www.sigmalive.com/simerini/politics/427268/to-mparmparos-den-xala-to-israil (accessed 24/11/2017)

Πιμπίσης, Α., 'Κλείδωσαν οι τριμερείς με Ισραήλ και Ιορδανία', *Ο Φιλελεύθερος*, 5 December 2017. Available from: http://www.philenews.com/eidiseis/politiki/article/461783/kleidosan-oi-trimereis-me-israil-kai-iordania134 (accessed 5/12/2017)

Energypress, 'Συναντήσεις Λακκοτρύπη με Shell και Fenosa για να πάει το αέριο της Αφροδίτης στα τερματικά της Αιγύπτου', *energypress.gr* [website], 22 November 2017. Available from: https://energypress.gr/news/synantiseis-lakkotrypi-me-shell-kai-fenosa-gia-na-paei-aerio-tis-afroditis-sta-termatika-tis (accessed 22/11/2017)

Energypress, 'Κύπρος, Ελλάδα, Ισραήλ και Ιταλία υπέγραψαν μνημόνιο συναντίληψης για τον αγωγό EastMed', *energypress.gr* [website], 5 December 2017. Available from: https://energypress.gr/news/kypros-ellada-israil-kai-italia-ypegrapsan-mnimonio-synantilipsis-gia-ton-agogo-eastmed (accessed 5/12/2017)

Energypress, 'Ρουγκέρι: Στο περιβάλλον του 2020 ο EastMed θα είναι εξαιρετικά ανταγωνιστικός', energypress [website], 6 December 2017. Available from: https://energypress.gr/news/roygkeri-sto-perivallon-toy-2020-o-eastmed-tha-einai-exairetika-antagonistikos (accessed 6/12/2017)

Enikonomia.gr, 'Επισφραγίστηκε κλαδική συμφωνία για τον τουρισμό μεταξύ Ελλάδας-Κύπρου-Ισραήλ', *enikonomia.gr* [website], 3 July 2017 http://www.enikonomia.gr/tourism/158700,episfragistike-kladiki-symfonia-gia-ton-tourismo-metaxy-elladas-k.html (accessed 17/11/2017)

Famagusta News, 'Τουρισμός: Εκπλήξεις από Ισραήλ-Γερμανία για το ρεκόρ εννιαμήνου', *Famagusta News* [website], 18 October 2017. Avaılable from: https://famagusta.news/news/138196/ (17/11/2017)

Naftemporiki, 'Γάζα: Παλαιστίνιος νεκρός από ισραηλινά πυρά στις διαδηλώσεις κατά Τράμπ', Naftemporiki [website], 8 December 2017. Available from: http://www.naftemporiki.gr/story/1302839/gaza-palaistinios-nekros-apo-israilina-pura-stis-diadiloseis-kata-tramp (accessed 10/12/2017)

Touchtidou, S., 'Ερντογάν-Νετανιάχου: «Πόλεμος Δηλώσεων»', *Euronews* [website], 10 December 2017. Available from: http://gr.euronews.com/2017/12/10/erdogan-netaniaxou-polemos-diloseon?utm_term=Autofeed&utm_campaign=Echobox&utm_medium=Social&utm_source=Facebook#link_time=1512937840 (accessed 10/12/2017)

Legal texts

Agreement between the Republic of Cyprus and the Arab Republic of Egypt on the delimitation of the exclusive economic zone, Cairo 17 February 2003, United Nations Treaty Series vol. 2488, no. 44649

Agreement between the Government of the State of Israel and the Government of the State of Cyprus on the delimitation of the exclusive economic zone, Nicosia 17 December 2010, United Nations Treaty Series vol. 2740, no. 48387

Annex to Commission delegated regulation (EU)of 2 November 2017 amending Regulation (EU) No 347/2013 of the European Parliament and of the Council as regards the Union list of projects of common interest SWD (2017) 425 final, C (2017) 7834 final

European Parliament and Council Decision No 994/2012/EU of 25 October 2012 on establishing an information exchange mechanism with regard to intergovernmental agreements between Member States and third countries in the field of energy [2002] OJ L 299/13

European Parliament Resolution of 25 October 2016 on EU strategy for liquefied natural gas and gas storage (2016/2059(INI))

European Parliament and Council Decision (EU) 2017/684 of 5 April 2017 on establishing an information exchange mechanism with regard to intergovernmental agreements and non-binding instruments between Member States and third countries in the field of energy and repealing Decision No 994/2012/EU [2017] OJ L 99/1

Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community (TFEU) OJ C 306/1

UN GA Res 181 (29 November 1947) UN Doc A/RES/181 (II)

United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994), (UNCLOS)