

# THE GLOBAL RIVALRY FOR HYDROCARBONS AND TRANSPORT PIPELINES THEIR CONTRIBUTION TO GLOBAL SUSTAINABLE DEVELOPMENT

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## **Abstract**

*This paper attempts to present the undeclared rivalry over hydrocarbons and their pipelines mainly to Europe.*

*Hydrocarbons are the main source of energy production, which is the key factor in achieving and sustaining sustainable development. Securing them nowadays is one of the most important issues that concern all the states of the world, especially the developed ones.*

*After the Second World War ended, the objectives of the various states that had previously been directed at war operations, either for the annexation of new territories, or for the stabilization of existing borders, changed.*

*Their economic and social development is the most sought after, catalytically relying on energy resources.*

*Particularly after the very important Paris-based agreement in 2015 between 195 states on climate change and environmental protection, charcoal is being pushed aside, and natural gas as well as RES are being called upon to fill the energy gap that will emerge.*

*Hydrocarbon transport routes from their pumping points to consumer countries are also of utmost importance, due to the fact that their transit areas are geo-politically shielded and protected by the powerful states to which the companies involved in the management of these huge projects belong.*

**Keywords:** *Hydrocarbons, Transport Pipelines, Sustainable Development, Environmental Protection, Geopolitical Position, Exclusive Economic Zone.*

## **1. Generally**

Energy today is the key factor in the sustainable development of each country. It has been proven that developments in the energy sector are very difficult to be assessed. In any case, energy in the future will be determined by three factors.

1. Security of supply, supply and transport
2. Environmental developments
3. Development of technology

The issue of energy resources had already begun several decades ago, however it is a fact that over the past 60 years it has grown into a major global problem, and a top-notch of all states, with an emphasis on Europe, which has practically no hydrocarbon resources.

It is a fact that behind the various military operations or peace treaties there were often economic aspirations and goals in energy areas, especially by the powerful countries.

A recent example that put the world peace in danger is Syria's events in April 2018. Behind all the military operations for 8 years, lies the interest of the great powers over the exploitation and transport of hydrocarbons of the wider region.

An example of Hellenic interest is the so-called Lausanne Treaty of 1923, which, along with the resolution of territorial differences between Greece and Turkey, included the aspirations of the major states of Europe (England - Italy – France) for the hydrocarbons of Mosul.

Thus, the identification and exploitation of hydrocarbon deposits and their transport pipelines in European states have dominated over the last decades. At this point, it should be noted that global crude oil reserves will run out in a few years after 2050 (U.S Geological Survey, 2010.) The emphasis is therefore on natural gas that pollutes the atmosphere by 30-50% less than oil.

The routes followed by natural gas and crude oil pipelines are of major geopolitical choices due to the fact that they create conditions from the areas that they pass through

1. National stability
2. Geopolitics upgrade
3. Economic development

The obvious visible aspirations in this war, the usage and exploitation of hydrocarbons, as well as the route of their pipelines, mainly to Europe, are:

1. Europe's effort to stop be depended on Russian energy deposits
2. Russia's aim to remain the main factor in the exploitation and transportation of natural gas
3. The aim of the American factor to Limit Russian Sovereignty in the Gas Sector.

In relation to the contribution of natural gas to the battle against climate change, we can say that its contribution is catalytic. Its wide usage contributes to the achievement of the goal of the historic decision of the UN World Conference in Paris in December 2015, which is to keep our global warming below the 2 degrees Celsius by 2100. Of course, the UN's forecast over the increase of the world's population at 9-10 billion in 2100, from 6.8 billion today, creates uncertainty about carbon dioxide emissions at that time.

At the same time, gas is a major contributor to the protection of human health, since it has emissions of nitrogen oxide, ozone and micro particles within the allowed limits, according to the World Health Organization (European Environment Agency November. 2017).

Finally, it should be mentioned that natural gas is not yet a commodity; in the way oil and coal are currently valued. The reason is that its price is either national or international related to its transport costs.

Wherever there are no pipelines, which also have very high manufacturing costs, natural gas requires conversion to liquefied gas [LNG], and liquefaction facilities where the gas is cooled to -161 degrees Celsius at a very high cost. A similar installation of 30 billion euros is currently being built on the West Coast of Australia (Wallace, 2012).

## **2. Natural gas and environment**

The economic consequences from the effects of the rising of the sea levels will reach the astronomical amount of \$ 14bn per year if the Paris agreement of 2015 to keep the temperature rise below 20 degrees Celsius is not met. Medium-low income countries will suffer the more consequences, while high-income countries will suffer less because of the infrastructures they possess. It should be noted that more than 600 million people live in areas less than 10 meters above sea level.

The global scientific community has come to the conclusion that a 1.5 degree increase in temperature results in 0.52 meter rise in sea level, an increase of 2 degrees by 0.86 meters, and if at the same time the increase is not limited below 2 degrees there is a risk that the rise will reach even 1.80 meters. At the same time, other consequences of climate change are heat waves - droughts floods.

In 2010 extreme the natural phenomena recorded were:

1. Pakistan. Floods with 1,400 casualties.
2. Russia. Fires with leaving 12,000 people dead.

Antarctica, which has 90% of global glaciers, runs the risk of disappearing by 2100.

The rise of the sea level, which is affected by the melting of glaciers and the rise in temperature, will cause huge disasters in Bangladesh-Egypt-Nigeria, while in Greece areas such as Mesolongi are feared for major consequences.

The ambitious EU targets on climate change are focused:

1. The reduction of greenhouse gas emissions by 40% compared to 1990 levels.
2. The increase in energy efficiency by 27%.

Climate change does not only means temperature increases, but mainly an increase in extreme natural phenomena such as storms, tornadoes, floods, droughts, and heat waves.

In many major cities such as Beijing, Paris, Chicago, the phenomenon of the presence of mass release of large micro particles is observed, mainly in industrial areas, resulting in rainfalls that are increased because the pollutants act as condensation cores in the clouds.

Within these environmental data, pollutant emissions from energy sources will catalytically determine the course of climate change. Oil is constantly decreasing, while its consumption is rising and rising and at a great pace. RES, nuclear power and, above all, gas are required to catch up.

With the extensive use of gas in industries, businesses and consumers, we deal with air pollution at the heart of the problem. Countries with hydrocarbon reserves are obviously in an advantageous position, because besides the reserves they possess, they have benefited from a large increase in their price [almost doubled]. In this way, Russia not only improved its finances but also regained its lost world prestige (DEPA, 2017).

According to the Carbon Brief Defense Group in America, natural gas contributes to reducing air pollutants by 50% more than wind and solar energy accumulatively. A specific example is the US continent, where the largest usage of natural gas since 2005 in electricity generation has led to a 14% reduction in pollutant emissions in the atmosphere (USA Carbon Brief, 2017).

It is well known that transports have the greatest responsibility for atmospheric pollutants. Natural gas is the means of limiting this air pollution. According to recent DEPA data, natural gas engines produce 25% less carbon dioxide than gasoline and 35% less than oil engines. It should be noted that carbon dioxide is the main gas to be blamed for the greenhouse effect. At the same time, natural gas engines achieve a 95% reduction in carbon monoxide in comparison to gasoline engines (DEPA Athens, 2017).

### **The historic decision on climate change in Paris 12th 2015 Paris, December 2015.**

195 countries agree to make every effort to contain the warming of our planet below 20 degrees Celsius.

The agreement will begin in 2020 and aims to:

- To limit the production of energy from fossil fuels [coal-oil].
- The development of RES.
- In very large energy economies.
- Increased protection of forests.
- On 10-5-16, ratification was completed from 72 countries around the world that emit 56.75% of greenhouse gas emissions. Thus the agreement entered into force, according to what the agreement requires.

- America, China and India, which are the major polluters, have ratified the agreement, thus emitting a message of optimism about the success of this historic effort to curb the overwarming of our planet.

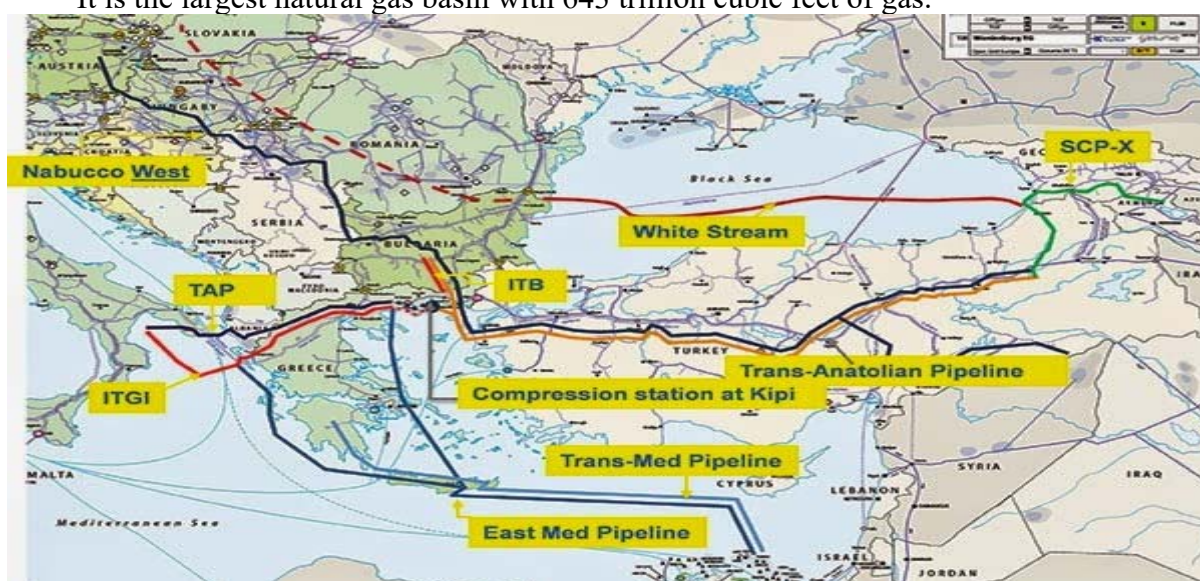
### 3. Hydrocarbons world spectrum

The great effort to reduce coal, as well as in a second phase of oil, which in a few decades will run out, highlights the great importance of natural gas.

It is advisable to take a look at the current large world hydrocarbon reserves and in particular the natural gas sources. More specifically, the USGS-Energy Recourses Program states the following (USAGES Energy Resources Program, 2018).

#### 1. Russia - Western Siberian Basin

It is the largest natural gas basin with 643 trillion cubic feet of gas.



**Figure 1:** Hydrocarbons pipeline transportation system in Southeast Europe

#### 2. North Western Saudi Arabia-Northern Yemen

The existing Rub Al Khali basin contains 426 trillion cubic feet of natural gas.

#### 3. East Saudi Arabia

Containing 227 trillion cubic feet.

#### 4. Gulf Bay, Iran-Iraq

The Zagros Fold Belt field with 212 trillion cubic feet of natural gas.

#### East Mediterranean Basin along with the Aegean

It consists of the Levant Basin found on the Cyprus-Lebanon-Syrian-Egyptian coast containing 345 billion cubic feet of natural gas and 3.4 billion barrels of fuel oil.

It is worth noting that the South East Mediterranean deposits have attracted the interest of US-Russia-EU and other regional countries in the recent years. Figure 1 shows the large hydrocarbon pipeline transportation system to Europe (8. <http://pipelinesinternational.com>).

So much is the interest of the American factor for hydrocarbons in the South East Mediterranean, that according to some information, America is in agreement with Egypt-

Israel-Greece-Cyprus so as to use dollars as a trading currency for hydrocarbons and respectively America takes over the security of the area.

The aforementioned point has to do with the Eurozone's thoughts of using the Euro as a trading currency (Pitagis, 2014).

At the same time, Russia's interest for the deposits of this region is immense for the following reasons.

1. It ensures a European natural gas supply monopoly, either from Russia or from other areas controlled by Russia
2. Decisive participation through Gazprom in the transport of hydrocarbons.

The EU, for its part, wants to be energetically dissociated from Russia. Therefore, the Southeast Mediterranean resources present Europe with a first-rate opportunity.

China, for its part, has a great interest in engaging in these hydrocarbon reserves in order to have a fourth alternative hydrocarbons source of supply besides that of Russia-Middle East-Central Asia.

Finally, Turkey has two main goals.

1. To obtain access so as to cooperate in joint venture over hydrocarbons in the Southeastern Mediterranean gaining economic benefits and becoming independent from Russia.
2. To become the largest gas hub to Europe, taking advantage of all the geopolitical benefits that this development entails. Figure 2 shows the largest hydrocarbon reserves in the wider region of the Middle East (BP Statistical Review, 2013).

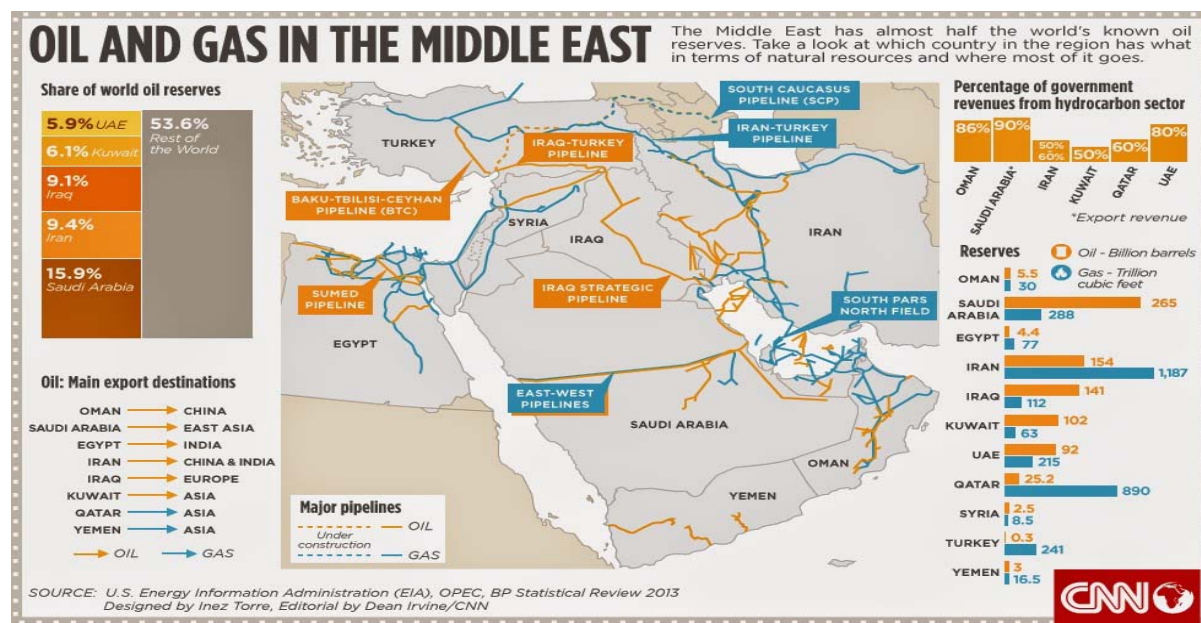


Figure 2: Middle East hydrocarbons reserves

### Natural Shale gas

A very big breakthrough in the natural gas sector is its extraction from shale rocks. Shale is of the most widespread rocks. The hydrocracking method through which the natural gas is pumped lies in channeling high pressure water-sand-chemicals. In this way, the rock is ruptured and natural gas is released. Within a few years its production in the US of 4 billion cubic meters reached 67 billion cubic meters, covering 10% of the domestic consumption.

It seems reasonable to wonder why Europe, which has large shale rocks reserves, as well as other countries, such as China, are particularly skeptical over the use of hydrocracking. The reason is that there are serious concerns about the method used, which are focused (Elafros, 2014):

1. The emission of air pollutants, such as oxides of nitrogen, sulfur, carbon, hydrocarbons, etc.
2. Toxic chemicals emission through sewage.
3. Possibility of seismic stimulation.

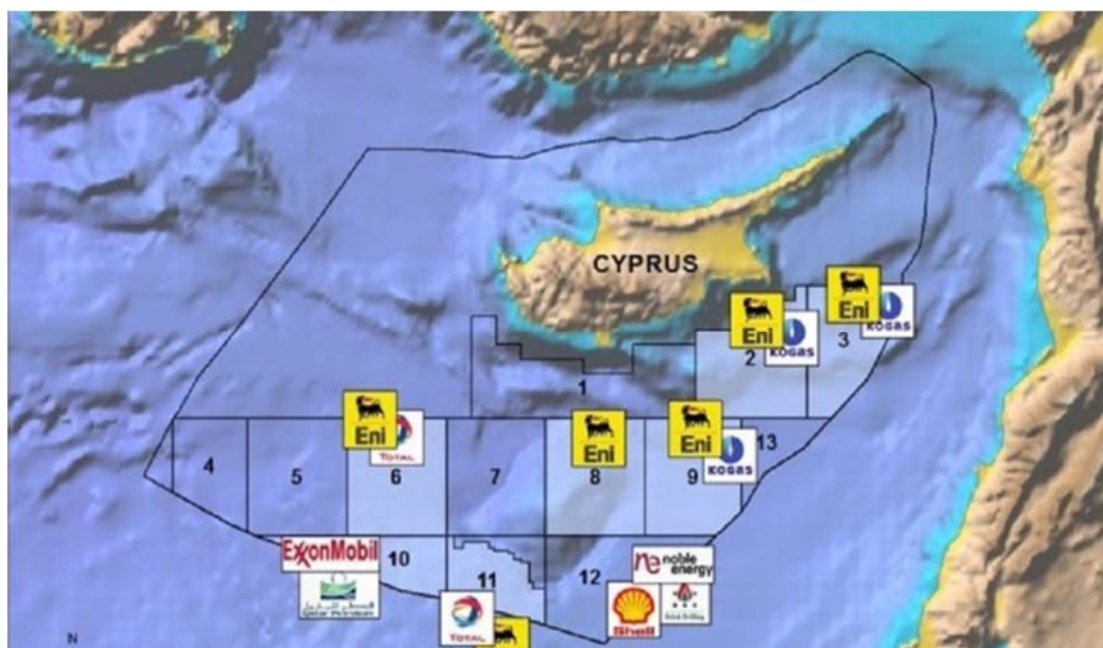
#### **4. The major importance of hydrocarbon pipelines transport system**

In July 2017, the American aircraft carrier George Bush, four French frigates, Greek warship Nikephoros and an Israeli warship, along with the French Defense Minister, protected the plot 11 in the EEZ of Cyprus, where the French company Total started drilling for natural gas.

The reason for that were Turkey's threats to prevent the exploitation of the existing deposits of the Cyprus EEZ. Figure 3 shows the layout of the sea plots of the Cypriot EEZ (Hellas Journal.com).

This act demonstrates the immense importance of hydrocarbon fields, combined with their transport pipelines system, states' EEZs and their geopolitical position.

A second example is the global crisis in May 2018 in Syria, with the involvement of US-Russia-England, which was not far from evolving into a war conflict.



**Figure 3: Cyprus EEZ Hydrocarbons Sea plots**

#### **Natural Gas behind the Crisis in Syria**

It all started in 2009. At that time Syria rejected a proposal by Qatar to build a gas pipeline that would transport Qatar gas, cross Saudi Arabia-Jordan-Syria, end up in Turkey and from there to southern Europe.

In 2010, Syrian President Assad proposed the creation of a gas pipeline, starting from Iran, crossing Iraq and ending up in Syria. From there, in liquefied form it would be transported to Europe with tankers, (Islamice Pipeline).

This proposal has triggered a series of events since then, such as the creation of ISIS, the organization of many struggling war groups with the aim of seizing power in Syria, and the active involvement of many large foreign countries that in a number of ways strengthened those groups, which would best serve their interests, always in the field of exploitation and transport of the region's natural gas.

## Continental Shelf- EEZ

Since both the extraction of hydrocarbons and their transport pipelines system are significantly affected by the definition of the EEZs of the States concerned and also by the boundaries of their continental shelf, it is appropriate to take a brief look at the international conventions which define the specific maritime zones.

## Historical development of EEZ - continental shelf - territorial waters

Let us see how the following issues have developed over time in all countries:

### 1. EEZ:

- Maritime area in which the State has the right to explore and exploit marine resources
- This right of the state refers to rights below sea level, which is considered to be international waters
- In 1982, the United Nations Convention on the Law of the Sea (the Montenegro Convention) was adopted by 157 States. This defines the EEZ at 200 nautical miles. In case of overlapping two-state EEZ, the average distance shall be applied.



Figure 4: EEZ based on the law of the sea

Figure 4 shows the EEZ in the wider Aegean and South-Eastern Mediterranean region (pentapostagma.gr).

### 2. **Territorial waters:**

- Concerning full sovereignty of the state.
- Initially they had an area of three nautical miles. Today it is 6 miles.
- According to the law of the sea in 1982, which Turkey has not ratified, territorial waters can be extended to 12 miles, after a decision of the International Court of Justice in The Hague in 1970.

### 3. **Continental shelf:**

- Geologically is defined as the smooth extension of the coast below the sea surface to the point where it abruptly stops with a 30 to 45 degree inclination.

- Under the Treaty on the Law of the Sea, the Continental Shelf may extend 200 nautical miles from the coast.
- Inhabited islands under the same convention have a continental shelf and an EEZ.
- The International Court of The Hague has decided that "the law of the sea" is international law and also binds the states that have not signed it, such as Turkey.

### Greek EEZ and continental shelf

- Greece has not yet established an EEZ with its 6 neighbouring countries.
- A continental shelf has been delineated only with Italy since 1977.
- An informal EEZ agreement between Greece and Cyprus is being promoted.
- In 2017 Greece - Cyprus - Egypt began discussions to define their EEZs, as well as between Greece and Albania.
- Athens and Cairo have been in talks on defining a continental shelf since 2006, but Turkey's interference with Egypt hinders the solution.
- Just before Albania ratified the agreement, it withdrawn due to Turkey-Italy interventions.
- In 2015 Greece and Italy were close to setting their EEZ.
- However, the fishermen of southern Italy have reacted, and there is a rumour that Mafia in Italy reacted as well, which is accused of burying illegal waste in the seas off Italy.

### The cases of the South Stream and Burgas - Alexandroupolis pipelines

Two other Greek and European pipelines, as well as their final failure to be implemented, are typical examples of global interest in gas pipelines transport system, particularly between Russia-EU and America.

### South Stream pipeline

In 2008 Russia - Greece - Bulgaria sign the South Stream pipeline agreement. In one year the Greek-Bulgarian governments collapse. The South Stream pipeline would transport natural gas from Russia via Greece and Bulgaria to Italy, figure 5.



Figure 5: South Stream pipeline



The agreement is signed by Putin - Karamanlis - Stanichev in 2008 In 2010 Greece and Bulgaria are permanently withdrawn from the agreement.

In 2014 Putin announces the cancellation of the project, putting the blame on EU-America. Judicial inquiries in Greece refer to destabilization efforts in 2008 on the Greek government. Judicial inquiries are made for the "Plan Pythia" which aimed to attempt to the assassination of the Prime Minister of the country of that period.

### **Burgas - Alexandroupolis pipeline system**

In May 2007 Putin - Karamanlis - Stanichev (prime minister of Bulgaria) signed an agreement in Bulgaria on the Burgas (Bulgaria) - Alexandroupolis, which would transport crude oil from the Caspian Sea. This oil then with super-tankers, of the highest security would be transported to Europe.

In December 2011 the Bulgarian side leaves the project. Obviously the American factor opposed in this project and possibly the EU as well.



**Figure 6:** Bourgas-Alexandroupolis pipeline

#### **Geopolitical benefits**

- International Upgrade of our country's strategic role in the field of energy.
- Promoting and safeguarding of the geo-strategic position of Thrace.
- Strengthening Greece's positions on EEZs in the Aegean.

#### **Economic benefits**

- Thousands of jobs.
- Profit from the quantities of gases flowing through Greece.
- Uninterrupted supply of energy from many pipelines.
- Unfortunately, the US-Russia rivalry dipole and in some cases the EU did not result in their implementation.

## **5. Greece as significant pole in the hydrocarbons management and transport pipeline system**

Greece's position in the war on gas pipelines is crucial. Increase in the value of oil prices, due to the fluidity in the Middle East, as well as the EU's sensitivity over environmental pollution, have significantly upgraded natural gas.

The transportation of natural gas through terrestrial pipelines creates a need in the EU to be supplied with large quantities of natural gas from Russia. This EU dependence on Russia creates a great deal of insecurity. It is at this point that the important role that Greece can play due to its geopolitical position can be highlighted.

The key factors of Greece's role in gas transportation are:

- Its proximity to Turkey which already has several gas transmission networks, as well as from Iran and the Caspian Sea
- Its short distance from the Middle East and North Africa, which makes it a necessary crossing point for the various gas pipelines

### **Existing and future natural gas pipelines in Greece**

1. Russia-Bulgaria-Greece pipeline
2. Revythousa: liquefied gas terminal station
3. Trans Adriatic Pipeline (TAP)
4. EAST MED (Eastern Mediterranean Pipeline)
5. IGB (Interconnector Greece – Bulgaria)
6. Greek Stream
7. ITGI (Interconnector - Turkey - Greece - Italy)

### **Russia - Bulgaria - Greece pipeline**

- In Greece, the first agreement took place in 1987 between Greece and Russia for the transport of gas from Russia and specifically from the Greek-Bulgarian borders. The project was completed in 1996 and is today the main gas supplier in Greece.
- The pipeline has a length of 512 km to Attica and branches of 779 km to cover Thessaloniki - Thessaly - Eastern Macedonia - Central Greece.
- Nowadays efforts are being made to extend it to the Peloponnese.

### **Revythousa - Terminal liquefied gas station**

- Since 1999 the Liquefied Gas Terminal has been operating in Revythousa - a small uninhabited island near Salamina, figure 7.
- Receives shiploads of liquefied natural ships. It transforms them into gaseous form and then promotes them to the national gas network.
- Liquefied gas comes with tanks from Algeria.
- It is already evolving into a server center, from which with trucks all Greece and the Balkans will be supplied.
- This station is one of the 10 operating throughout the Mediterranean and Europe.

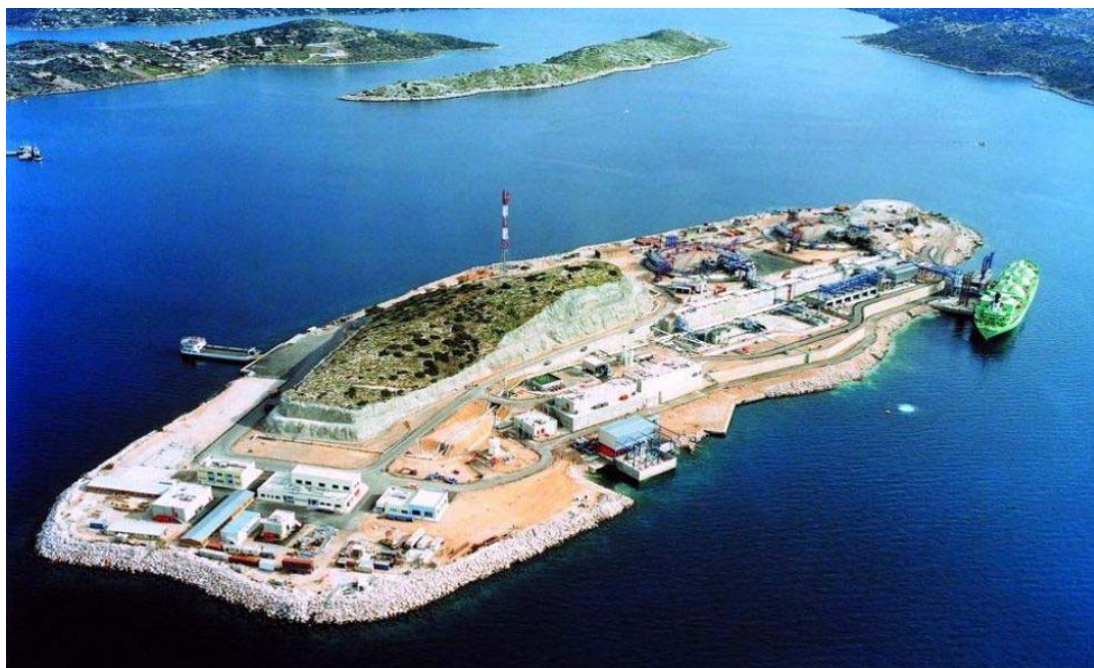


Figure 7: Revythousa - Liquefied gas station

#### TAP Pipeline (Trans Adriatic Pipeline)

- The pipeline will transport natural gas from Azerbaijan [Caspian Sea] via Turkey-Greece-Albania to Europe, Figure 6.



Figure 8: TAP pipeline

- In Greece, TAP will start from the Greek-Turkish border (Kipoi) and through Greece - Albania will reach Italy.
- It is 878 km long, of which 550 are in Greece.
- The project started in May 2016.
- Currently, 1500 workers are directly employed in Greece and several thousand indirectly.
- Greek companies such as Terna -Actor, JP-AVAX are involved in the construction of the pipeline and the pipeline manufacture companies in Korinthos supply the 32000 pipe tubes of the project.
- Completion of the project in 2020.

- It is an Investment of 2 billion Euros, the largest investment in our country today.

### East - Med pipeline (Eastern Mediterranean Pipeline)

- The three main steps of the pipeline are Limassol - Crete - N. Peloponnese.



Figure 9: MED EAST pipeline

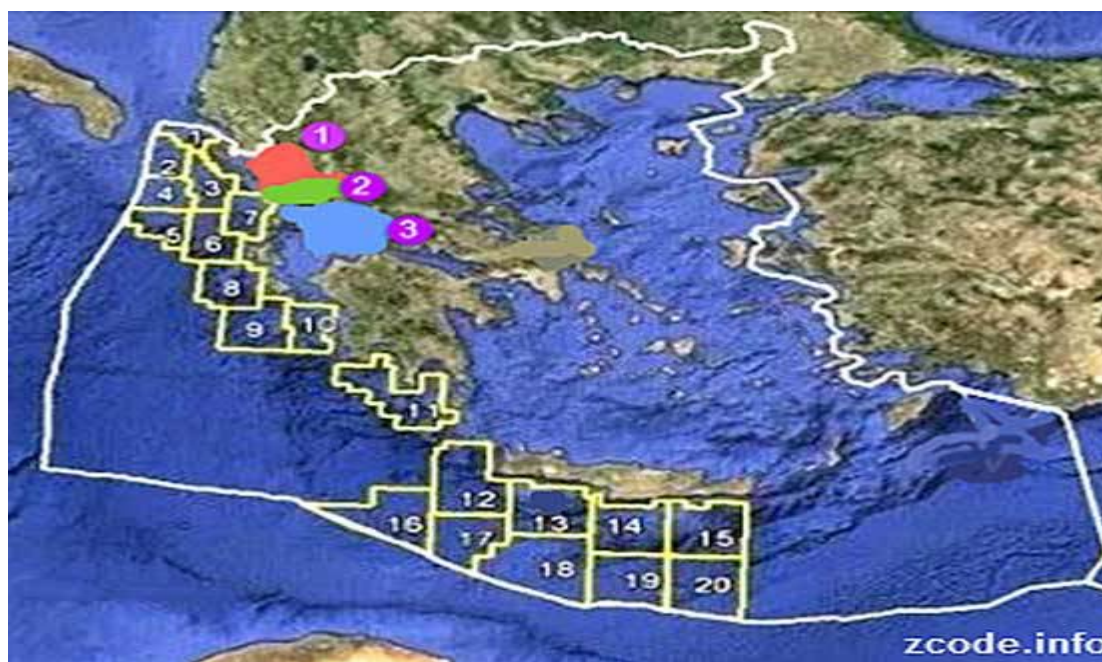
- Turkey's transit is avoided and thus constitutes a steady supply of Europe with natural gas.
- In April 2007 Greece - Cyprus - Israel - Italy signed the pipeline agreement, in the presence of the European Commissioner for Energy.
- The pipeline will be 2 thousand km long and will cost 6.4 billion dollars.

### IGB Pipeline (Interconnector Greece Bulgaria)

- It is a strategic gas pipeline between Greece and Bulgaria.
- It will be 180 km long.
- It will be connected to TAP and the terminal station at Revythousa.
- This pipeline as well participates in European Union's non dependence from Russia.

## 6. The landscape of Greece's hydrocarbons reserves

Greece's efforts for the exploration and exploitation of hydrocarbons are focused in seven seas and three land areas in the coming years. More specifically, the situation is as follows presented on Chart 8 (Basia - Bellas - HMCH, 2018).



**Figure 10:** Hellenic hydrocarbons sea plots

**1. Katakolo**

It is the most mature drilling that will take place in the period 2019-2020. The convention has been approved by the Greek Parliament and the deposit is estimated at 10-12 million barrels of oil.

**2. Western Gulf of Patras**

The first drilling will begin in 2019-2020. The convention has been ratified by the Parliament and the deposit is estimated at 100 million oil barrels.

**3. Ioannina**

The existing deposit is estimated at 50-100 million barrels of oil. The first drilling will take place in 2021 and the contract of the project has been approved by the Parliament.

**4. Arta-Preveza-Northwest Peloponnese**

In May 2018, the parliament approved research contracts on these sea plots.

**5. Southern of Crete-Southwest of Crete-Ionian**

Global-consortium negotiations [Total-Exxonmobil-Repsol] for research are concluding.

**6. Sea Plots 2-Western of Corfu**

The region's concession agreement for hydrocarbon extraction was signed in October 2017 in favor for the Total-Edison-ELPE joint venture.

**7. Conclusions – Proposals**

The listing of data in this paper leaves no doubt that the current year and the coming decades will be characterized by an “undeclared global war” control of the world's energy resources and their pipelines transportation system

The reason is none other, than to ensure the best conditions for achieving sustainable development of all countries, especially those that are economically developed.

These data can and should be a reason for a new beginning of normalization of differences at a global level, which poison the relations, more particularly of the more powerful countries, towards peaceful coexistence, the fight against poverty in developing

countries and the achievement of sustainable development around the world. Targeting should focus on the following steps:

1. Ending the tensions and hostilities in the regions, [Syria-Persian Gulf, Southeastern Europe etc], where the existing hydrocarbon deposits trigger local rivalries, with the direct involvement of the great powers, apparently for their own interests.
2. Delimitation of the EEZs of the states involved, which the large contractors involved in the relevant projects are gradually starting to impose.
3. Uninterrupted exploitation of the world's natural gas reserves, , because that's the only way, combined with the reduction in the use of coal and oil it will be possible to achieve the environmental objective of the UN Treaty in Paris in 2015, where it was decided to keep our planet warming below 2 degrees by 2100.
4. Technological improvement of the way of pumping shale Natural Gas in order to eliminate the environmental side-effects, which are caused. This will take advantage of the enormous natural gas reserves that exist across our planet.
5. Major increase in the use of RES, improving the efficiency of both solar and wind systems, which combined with natural gas is much more appropriate.
6. An effort to reduce global energy consumption, through bioclimatic applications in the building sector, but also extensive use of natural gas in transport, industry, electricity generation etc.

Owning significant energy resources and a key place in the development of natural gas transmission networks, mainly in Europe, Greece is one of the countries that is already starting to play an important role in the energy sector.

In this direction, our country should aim at the following:

1. The faster completion of the TAP pipeline, which will create a second source of gas supply for our country, adding economic benefits and finally will nationally shield its transit area. [Thrace]
2. In the quicker possible promotion of the East-Med pipeline, this, along with its economic benefits, will geopolitically upgrade its southern transit areas in our country.
3. The uninterrupted usage and exploitation of the ten areas that hydrocarbons have been found in our country.
4. To continue and strengthen our cooperation with Israel-Egypt-Cyprus in the energy sector, to exploit the very large natural gas deposit that has been identified in the intermediate sea plots.
5. In the shortest possible delimitation of the Greek EEZ with our neighboring states [Cyprus-Albania-Italy-Egypt-Israel], in order to determine the Greek plots that are under investigation for hydrocarbons.

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