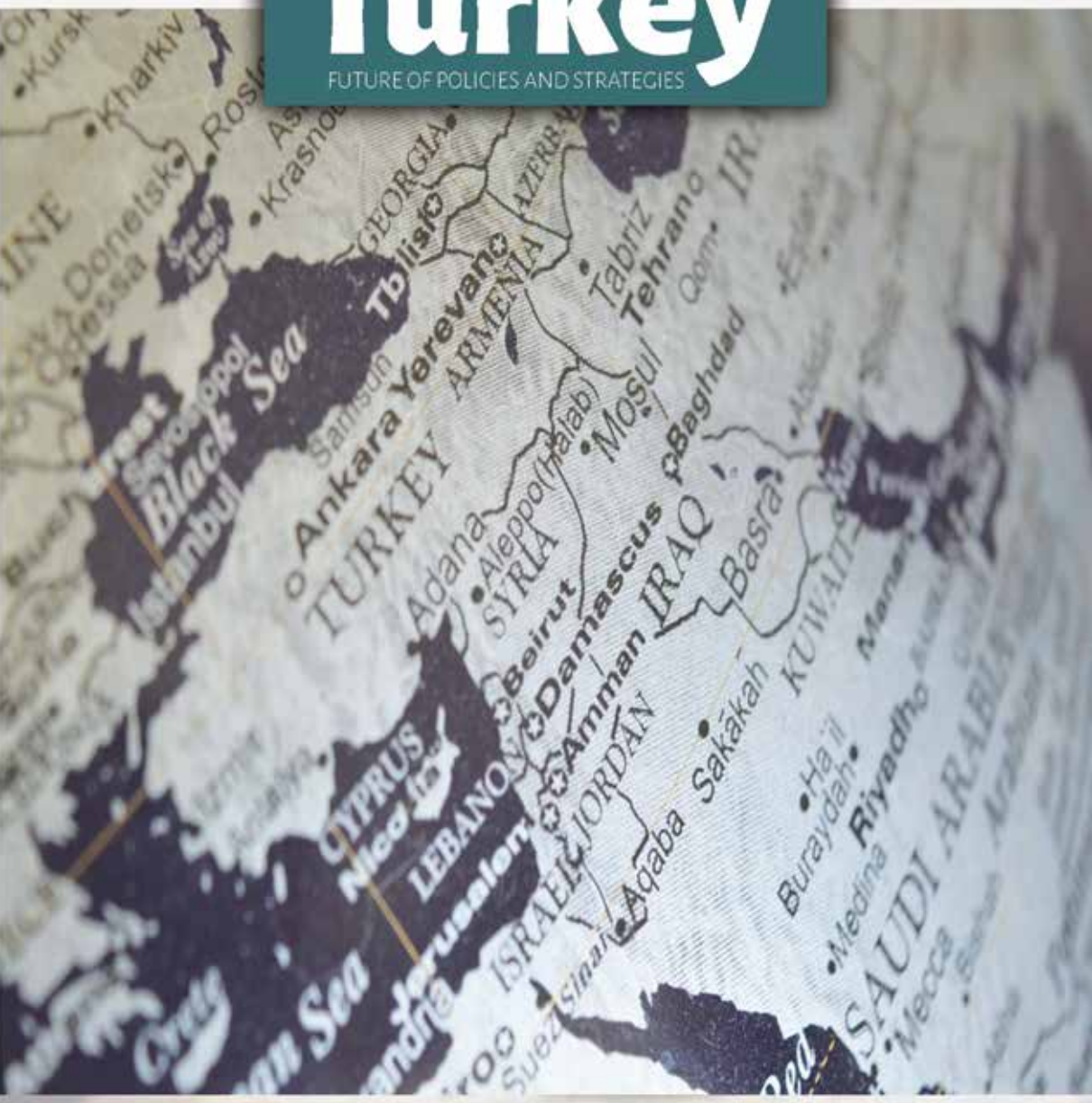
August 2017
www.tespam.org
www.energypolicyturkey.com

Energy Policy Turkey

FUTURE OF POLICIES AND STRATEGIES

TESPAM



CYPRUSENERGY CORRIDOR • QATAR CRISIS AND ENERGY
LIBYA: POLITICS & ENERGY • WATER CONFLICTS IN NORTHERN SYRIA
TURKEY'S LNG FUTURE & EXTERNAL THREATS TO DERAIL
ANKARA'S STRATEGY? • IRAQ: GOING BACK AND FORTH
NUCLEAR POWER,ITS WASTE IN THEWORLD AND IN TURKEY
AKKUYU NUCLEAR POWER PLANT COST & BENEFIT ANALYSIS

ENERGY POLICY TURKEY

AUGUST 2017

ISSUE 4

Editor in Chief
Sulayman CHAM

Editor
Sahin COSKUN

Advisor
Necdet KARAKURT

General Coordinator
ALİ MARAŞLI

Rights Holder on Behalf of
Turkey Energy Strategies and Politics Research Center (TESPAM)

OĞUZHAN AKYENER

Publishing Coordinator
ÖZAY SAĞIR

Advertisement Coordination
Odaklı Medya Grup

Management Center
290 Sk. 46/12 Karapürçek-Altındağ / ANKARA

Address:
Main OfŞce (Ankara)
Nasuh Akar Mh. 1403. Sk. No: 8/4
Balgat - Çankaya / ANKARA
Phone: +90 (312) 666 26 99
Fax: +90 (312) 666 64 05

Branch OfŞce (İstanbul)
Tatlısu Mah. Seyhan Sk. Elalmış Cad. No: 7 D: 1
Şerİfali - Ümraniye / İSTANBUL
Phone: +90 (216) 527 32 62
Fax: +90 (216) 527 32 63

E-mail: info@energypolicyturkey.com
Web Address: www.energypolicyturkey.com

Published by İstanbul Basım

EDITOR'S NOTE

Energy Policy Turkey (EPT), now widely recognized and followed throughout the world, has been focusing on energy strategies and policies in and around Turkey or wherever Turkey is involved in "The Energy Game". EPT performs countrywide, regional and worldwide studies and analysis to make the best judgement on policies for energy supply-demand chain, security, and energy routes, energy related regional and international conflicts, etc.

EPT's previous issues have made bold statements about Turkey to finally take the initiative in the balance of world's energy equation. The vast reserves of the Middle East and Africa regions have been ridiculed by terror and tribal confrontations, international disputes and fights and even wars. The West has been the authority in those regions by using divide-separate-manage rule; however, a few Eastern countries such as Turkey, Russia and China have stood up against the Western hegemony in energy matters. The shining stars of the East are now balancing the energy equation and reshaping the key elements of the global energy game.

The fourth issue is dedicated to illuminate a few regional matters in the world energy balance and weighed advices for Turkey's current and future strategies and policies. For instance, Turkey's current strategy in Cyprus talks lacks credibility since Turkey aims to achieve an agreement of Turkish share over Cyprus gas but, in fact, there is no discovery other than Aphrodite Field, which has no economic value alone. What is to be done at this point is to redesign its exterior political agenda on solid technical finds, i.e. gas options should be omitted from Cyprus talks since there is no technical evidence or proven gas finds. Turkey can suggest to add such topic after a commercial discovery. Perhaps, should play its water card against Greeks to settle political conflicts over the island. Cyprus article outlines the strategy behind Cyprus Energy Corridor and resource potential of Eastern Mediterranean. It gives critical advices to reconfigure Turkey's strategies to simply shape the future of the island.

The artificial Qatar crisis brought by Saudi Arabia, Egypt and United Arab Emirates (UAE) is an interesting story to read. Behind the scene mastermind Israel, United Kingdom and United States of America's (The Evil) unilateral game changer strategies have sacrificed those countries that created the crisis against Qatar. Turkey's full support for Qatar has increased its popularity and access to the Arabic Peninsula. Understanding causes of the crisis is the key to step forward by well-designed intellectual strategies.

Current dynamics of Libya and Iraq requires at most attention as these countries are at top of the list of countries with high proven oil reserves. Unresolved governmental restructuring and/or separation has been taking place in both countries, which suggests Turkey has to be involved with new and astonishing strategies either politically or eco-

nomically or both. It should kept in mind that ignoring or staying away from restructuring is only going to destroy Turkey's presence in those countries.

Some advertisements to aggravate Turkey's military intervention in Syria is observed in the media that Turkey limits water flow from Euphrates. This is a very old story but some people still use it as a propaganda against Turkey. Such action indicates how desperate the mastermind (The Evil) has gotten by using old fashionable way assuming that the Muslim world is still illiterate. Let's make a clear note to The Evil: Grow up! Muslims do NOT buy those stupid tricks anymore!

Turkey has done a great job by building New LNG facilities and storage expansions along with new international gas pipeline projects. Installing additional capacity in both LNG and natural gas is going to create a solid impact on Turkey's ambitions to become "The Energy Hub" in its region. Understanding the diversity of supplies and energy security issues is going to increase Turkey's competitiveness in the market that will eventually help Turkey become a bridge between Asia and Europe in the future.

Nuclear power is another option for Turkey's energy future as Turkey had given a start to build two Nuclear Power Plants in Akkuyu and Sinop. There are also arrangements for a third one in Thrace region. Having a nuclear technology through power plants sounds exciting but there are certain facts about radioactive pollution and wastes that Turkey definitely has to reconsider. The government must articulate its nuclear waste management plans, prepare the necessary legislations, infrastructures, authoritative institutions, rules and regulations before the plants are activated.

EPT understands (Turkey and its partnering countries should understand as well) that defining and characterizing strategies are a serious business and should not be left in the hands of illiterates. Aiming towards the right direction obligates influential countries aggregating the experts from all related disciplines under the roof of energy. Genuine experts have been contributing to this precious idea and will continue and connect with valuable energy experts from all around the world to establish a solid framework for "The Future of Energy".

By TESPAM Publishing Coordinator Necdet Karakurt

CYPRUS ENERGY CORRIDOR

Necdet Karakurt
Oğuzhan Akyener

ABSTRACT

The initial Cyprus Energy Corridor idea was developed and introduced by Israel and its partners in crime: the United Kingdom (UK) and the United States of America (USA). This version of the corridor was exaggerated over the proposed Eastern Mediterranean (EastMed) Pipeline, which would route East Mediterranean gas reserves to Europe (EU) over Cyprus and Greece. It would apparently have the ability to connect with the Iran-Iraq-Syria Pipeline that will be safeguarded by a Kurdish Corridor that seems to be one of the main reasons behind the Syrian and Iraqi international conflicts in the region. If the plan was able to be succeeded, EU somehow would be able to find an alternative to Russian gas and secure its energy demands by East Mediterranean and Middle East gas over a corridor, where Anglo-Saxon driven domination occurs.

The idea suits well to the UK and USA's ambitions in the Middle East for controlling the Muslim majority populace by supporting a powerful (against Muslims but loyal to the West) Kurdish state that will eventually start swallowing or weakening the surrounding states. Jewish on the other hand, will have the upper hand in the region since Muslims will have to struggle with Kurds that are backed by the West. They will also control and have all the advantages of being the main supplier for EU through this new energy corridor. Perhaps, they will eventually reach the dream of the "Great Israel" in the future.

This whole scenario was nested over two energy routes. The first one covers the Middle East from Iran to Mediterranean, which suggests carrying Iranian and Iraqi gas over Syria. The second one was proposed over the Eastern Mediterranean from Egypt to Israel and to Cyprus, Greece and EU. Both pipelines had to pass feasibility requirements to be placed in action. Iranian gas was there for sure and Iraq also had some gas potential, therefore the first pipeline seems feasible from the sight of reserves. By the way, from the commercial sights, it would not be easy to transport Iranian gas through that route to EU. The second pipeline was requiring new discoveries and large enough reserves to attract investors or to find funding from international consortiums.

The current situation or the balances in the region clearly suggests that the speculative targets are highly unlikely reachable as there are many commercial, political, technical milestones and international agreements still to be handled.

Now, from the commercial and resource potential sights, Turkey stands out as seems to

be the only route for such a corridor. And only Israel's and Cyprus's gas is estimated to be able to be transported to EU markets via pipelines. And the export volume is around 10 bcma.

The study aims to cover the evaluation of all sights of the Cyprus Energy Corridor in accordance with, such as the commercial constraints, the due basins' hydrocarbon potentials, production profiles and etc.

INTRODUCTION

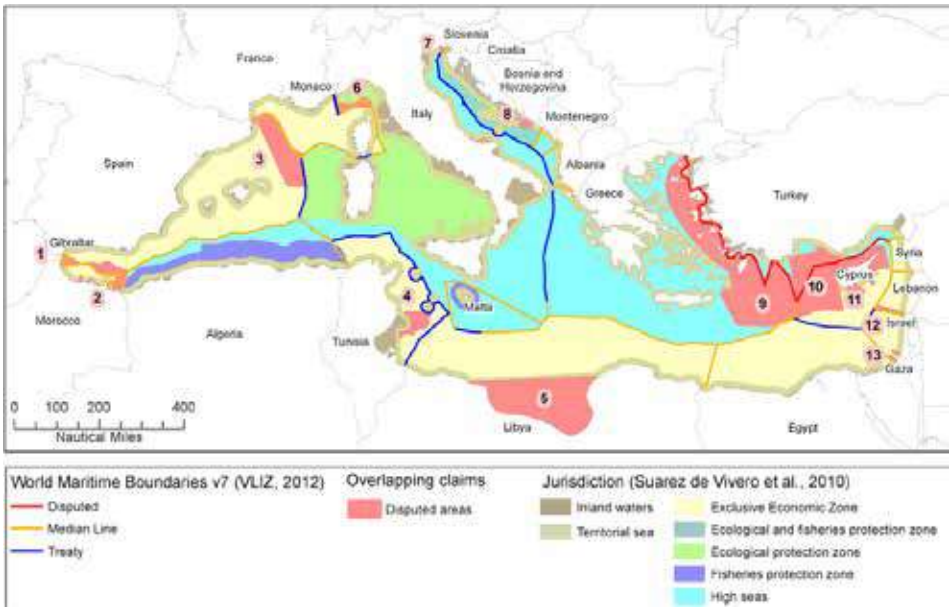
Israeli gas discoveries by Noble Energy in 2010 triggered the attention required for EastMed Pipeline but the reserves were not large enough to follow the dream. Western oil companies tried Egyptian offshore to increase the resources but newly discovered reserves on Nile delta were not promising. The idea had to be supported by other possible hydrocarbon reserves within the rest of the Eastern Mediterranean countries such as Cyprus, Lebanon and Syria.

Exploration activities in Syria are on hold since the war in the country still continues. Syrian offshore reserves estimates will have to wait till the war, the political conflicts and terrorism issues are settled. Lebanon reserves sound exciting as the Levantine Basin (from where Israel discovered natural gas) extends toward north and possibly Lebanon has the highest potential in the region. Geological and geophysical evidences suggest that Cyprus is not as lucky as Israel and Lebanon due to a few geological constraints on Cyprus side. The whole geoscientific analysis will be discussed in this article under the title of Eastern Mediterranean Hydrocarbon Potential.

The Cyprus Energy Corridor could only be achieved if Cyprus has large enough gas reserves for trading because it is the only way the West could empower Greeks in the Mediterranean, which can, indeed, end Turkish presence in the warm waters of Mediterranean. Cyprus talks indicate a unite Cyprus under Greek rule. Discovery of Aphrodite Field near Israel's offshore discoveries provided some ground for Cyprus having large enough gas reserves. Therefore, the idea behind the talks has been set even though there is no technical evidence of great gas reserves in the vicinity of so called Cyprus' national waters. The talks assume that Cyprus has great potential, which, if it is true, will definitely place Greek part of Cyprus at top priority in the talks and Turks will eventually lean towards accepting a Greek ruling in the island. This way, Turkish presence in the Mediterranean will be eliminated or minimized as Turkey's Exclusive Economic Zones (EEZ) will only be limited to the area between Turkey's southern shores and Cyprus. See Map 1 for the current EEZs in Mediterranean, from the Greek's sight (As they are accepting a unique Cyprus, which completely belongs to them.)

One of the main aims of the article is to analyze hydrocarbon potential of the Eastern Mediterranean especially that of Cyprus'. Available seismic (some already interpreted) on the internet will be used to discover certain characteristics and potentiality of both Levantine and Herodotus Basins. Additionally, some insights and facts for the so called Cyprus Energy Corridor will be addressed. Turkey's choices will be highlighted and a few facts regarding Anatolian Plate boundaries will be stated for Turkey's use in the talks for Cyprus, and disputed EEZs in Aegean Islands and Eastern Mediterranean.

Moreover, the current existing reserves and the production capabilities of the island will also be analyzed.



Map 1: A display of Exclusive Economic Zones of Mediterranean. Red highlights and lines refer to disputed areas and zones. Source: https://www.researchgate.net/figure/264563464_fig2_Fig-2-Marine-boundaries-and-disputes-in-the-Mediterranean-Sea-See-Table-S3-for-details

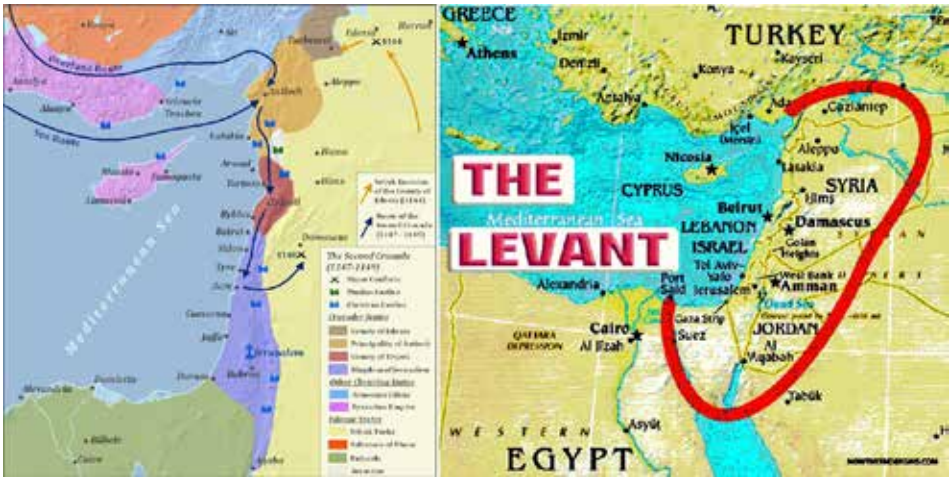
THE IDEA OF THE SO CALLED ENERGY CORRIDOR

The West Bloc's hunger to control vast energy reserves has always been triggering new conflicts, terrorism threat and even wars in the regions with vast energy reserves. The Middle East and Russia are known to be the major oil and gas suppliers for USA and EU, which is why they feel the urge to secure supply routes and also the reserves. Since they are unable to underestimate Russian military power, they tend to stay away from any military power conflicts with Russia. Their tendency shifts toward the Middle East and the Mediterranean where they can freely and secretly intervene in the affairs of any country and keep Russia out of the energy game.

Placing Israel persistently in the heart of the Middle East had its causes as Jews had demanded of a country, where they could finally find peace away from Catholic's barbarism in EU. Muslims' disdain of Israel has been elaborated by chosen Sheiks or dictators for decades. The west gained access to vast energy resources or basically having control over energy resources and the routes by bringing dictators or Sheiks (especially chosen from the minorities) in power. That way, the people of the country (majority populace) would stay away from the governmental jobs and duties and they would be pacified without even knowing who is really governing their country. It is surprising that this game has been working for over a century but EU's ambitions to set itself free of dependency on Russian gas has triggered unavoidable big changes in energy game.

USA, losing its dominance in Iraq and Syria to Russian backed opposition, configured another action plan, which is the Jews and Christians in disguise, namely Al-Dawla al-Islamiya al-Iraq al-Sham (Daesh) terrorizing both countries, doing ethnical and cultural cleansing in the region. The so called Daesh means Islamic State of Iraq and the Levant in English. The term "Levant" (See Map 2) is where "The Great Israel" was once used to be or where the ancient Jewish States had used to reside. Another important part is the fact that the Levant region overlies with the Crusader States that were built upon invaded areas by crusaders!

"The Church" agitated Christians to repel Muslims from the holy lands for centuries. The Church's credibility was able to gather large armies with finest swordsman in the beginning but Christian savages raging and destroying whatever they encounter on the way to Jerusalem lost its popularity with the loss of Mediterranean in the 16th century. The crusades was over but the driven force or the desire behind the crusades has never been ceased thoroughly. Jews, on the other hand, have never placed their selves in the front lines but they have encouraged the Christians through the church and provided economic support for the barbaric invaders as they seized and secured the way to Jerusalem.



Map 2: A map display of the Mediterranean region. The map on the left shows the Crusader States established after the Second Crusade. The map on the right refers to the Levant area, which was the land of ancient Jewish states. Interestingly, the terrorist group named Daesh claims these ancient Jewish land plus Iraq as its territories. Sources: http://www.wikiwand.com/en/Second_Crusade (left) and http://www.astralnewz.com/inforeportsthree/thecaliphate.html (right)

In today's world, the crusades' logic still continues to conquer the Levant region. However, their motivation has evolved from barbaric crusading armies towards small and puppet states in and around the Levant region that took stage after the fall of Ottoman Empire. Nowadays, the evolution process forms Islamic terrorist groups differentiated in scale and level but all of them are genuinely placed in the areas of high natural hydrocarbon reserves and of Islamic authority governance. USA and UK acting as the puppets of Israel (The Evil Triangle) invaded Iraq assuming Iraq had weapons of mass destruction but behind such action there was the need to take the first step for the new adjustment of the Middle East in accordance with "The Great Israel" plan. They would

destabilize Iraq and dismantle it to create a so called Kurdish State that would gain soil from the surrounding states such as Turkey, Iran and Syria.

The Evil Triangle were unfortunately unable to settle a Kurdish State in Iraq but went on to the second step to gather Kurdish tribes together in Syria to secure Kurdish state's extension to Mediterranean. It would be a lot easier to arm the Kurds in the region if Syria had insurgency and terrorist groups that threaten and destabilize Syria and at that point, The Evil Triangle formed another evil and named it Daesh, which had the ability to grab the half of Iraq and Syria in one night. The whole world believed that Daesh referred to an Islamic State and the extremist Muslims have come together to create a powerful Islamic state in the region but the truth was that they were crusading Jews and Christians. Daesh's secrecy increased the hate against Muslims in Christian world in favor of The Church plus influenced / deceived innocent Muslims' faith for the so called Islamic state that would be eventually left to Israel by the savages of Kurdish tribes.

The truth behind Daesh's occupation was to gain control over the areas for planned Iran-Iraq-Syria line and prepare the Middle East for Israel's expansion in the future. However, the unity of Islamic states with support of Orthodox Christians will definitely end the dream of The Great Israel and furthermore, that could very well be the end of Catholic Christianism era in the region and in the whole world.

The West took one step at a time and named terrorists as Israel hater Islamic fighters, and they even blamed Turkey for supporting Daesh so Muslims would believe / not be against Daesh and they would be lining with the terrorists since Daesh's so called mission is to erase Israel from the map.

Additionally, USA has been insisting on People's Defense Units (YPG) in the frontline of the fight against Daesh. The reason behind the insistence is that YPG forces will take over Daesh controlled areas, connect with the Kurds within the neighboring states so that the creation of a new Kurdish State safeguarding the Iran-Iraq-Syria line will be completed. In a more sophisticated way of wording: Third step of Great Israel will be accomplished in the region and Arab gas will have its chances to be transported to EU over the lands of the Western Bloc's supremacy.

In contrary, the Mediterranean's future is shaped over diplomacy and potentiality of hydrocarbon reserves. Noble Energy's discoveries in offshore Israel in 2010 seems to have triggered the Arab Spring in Tunisia, which, at last, reached Syria. It should be obvious that all (whatever happening in Africa and Middle East) is related to the rise of "The Great Israel". However, the process of changing the balances, reshaping the region and creating new states has to develop gradually or another world war can be unavoidable. Keeping this in mind, each step taken towards "The Great Israel" requires a very careful planning, great attention to details and the aftermath as well as a few backup plans are to be prepared to manipulate and mislead the world upon what is really happening behind the closed doors and on stage in the region. It is certain that the masterminds behind all the chaos are known to own, large international companies, and financial institutions of all kinds, international political or economic organizations and alliances throughout the world.

Scenarios for the Mediterranean are similar to those of the Middle East but the actors

and the game have certain differences. The main actors are again The Evil Triangle plus their Greek puppet that are smothering Mediterranean with energy resources and routes.

Israeli gas discoveries in Levantine Basin has triggered the action plan for EastMed Pipeline, which is shown in Map 3. The prior comments and declarations about the discoveries made a big fuss about Eastern Mediterranean gas potential. However, the reserve potentials did not comply with the declarations. The try for Egyptian offshore did not result in large discoveries, either. However, the game still continues since Cyprus, Lebanon and Syria are still speculative countries to contribute to the so called great potential of Eastern Mediterranean gas reserves.

Map 3: Display of proposed EastMed Pipeline (Dashed line) that will transport East Mediterranean gas supplies to EU over Cyprus and Greece. Source: https://www.slideshare.net/AndyloannouVaroshiotis/east-mediterranean-gas-fields

Cyprus Island is separated in two parts, Turkish backed government in the North, and Greek and England (EU dominant these days) backed part in the South. The Evil Triangle has been trying to empower Greeks in the island but Turks oppose the Greek ruling in the island for decades. With the gas discoveries in the region, they propose and pretend as Cyprus has great gas reserves potential to manipulate / mislead Turks so that Turks will eventually agree on Greek ruling in the island. Additionally, Turkey's EEZs in the Mediterranean will be minimized to the area between Turkey's south coasts and Cyprus Island. See Map 1 for the current EEZs.

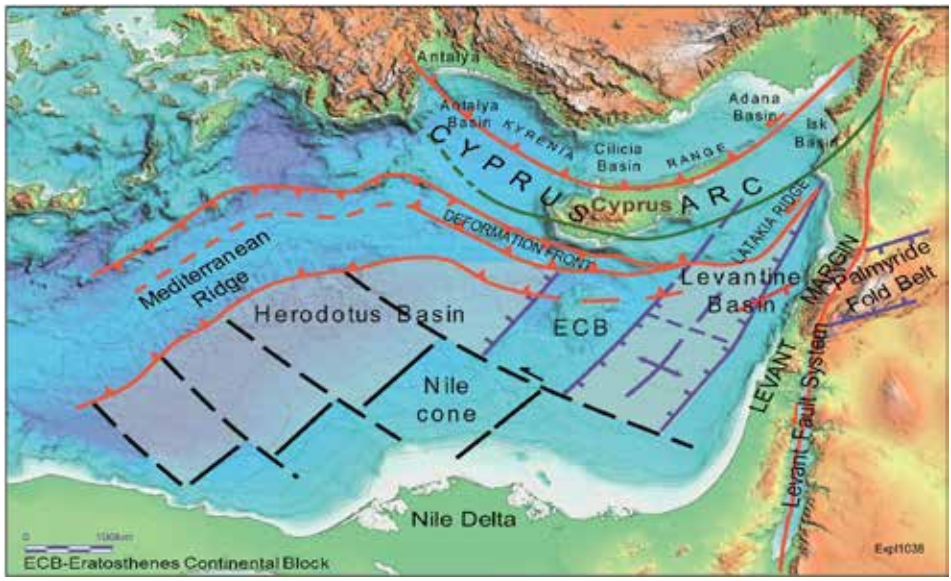
As it has been analyzed and discussed so far, The Cyprus Energy Corridor is not just a standalone project. It is a part of the whole "The Great Israel" plan that has been finely executed to reshape and govern the Middle East and Eastern Mediterranean. If the plan succeeds, the Greeks will fulfill their dream of claiming Istanbul and Anatolia, and Jews will finally obtain the lands they have been longing for. Kurdish militia (in reality a bunch of terrorists from different catholic nations) will fight for their freedom with the help

of The Evil Triangle and will most probably gain soil from Turkey and Iran. This will weaken Turks and Persians that is expected to result in the rise of Kurdistan. The so called Kurdistan will shoulder the duty of saving Jews from Turks left in the North and Persians left in the East. The south already exhibits signs of alliance with USA that will never pose a threat to Israel.

When The Great Israel is achieved and vast hydrocarbon reserves of the Middle East are secured, the only thing left to accomplish is the pipelines or transfer routes for the Jewish gas. Obviously, Cyprus Energy Corridor is applicable at this point. The Greeks with the halted economy has nothing to do but obey Jews since they will be taking care of Greece's finances and use them as puppets. Finally, Jews will have the advantage of being the main energy supplier of EU, which tactically means EU will be dependent on Jews forever.

EASTERN MEDITERRANEAN HYDROCARBON POTENTIAL

There are two basins mentioned as possible hydrocarbon bearing in Eastern Mediterranean. The two basins are named Heredotus in the West with no proven hydrocarbon reserves except the latest ENI discovery on Nile Delta and Levantine with proven hydrocarbon reserves especially on Israeli offshore in the East. Map 4 shows these basins and tectonic settings shaping the basin structures. ECB on the map refers to Eratosthenes Sea Mount, which acts as a barrier between those potential basins. Analyzing the two basins with the help of several seismic sections and tectonic settings will give some clear insights to anticipate East Mediterranean hydrocarbon potential.

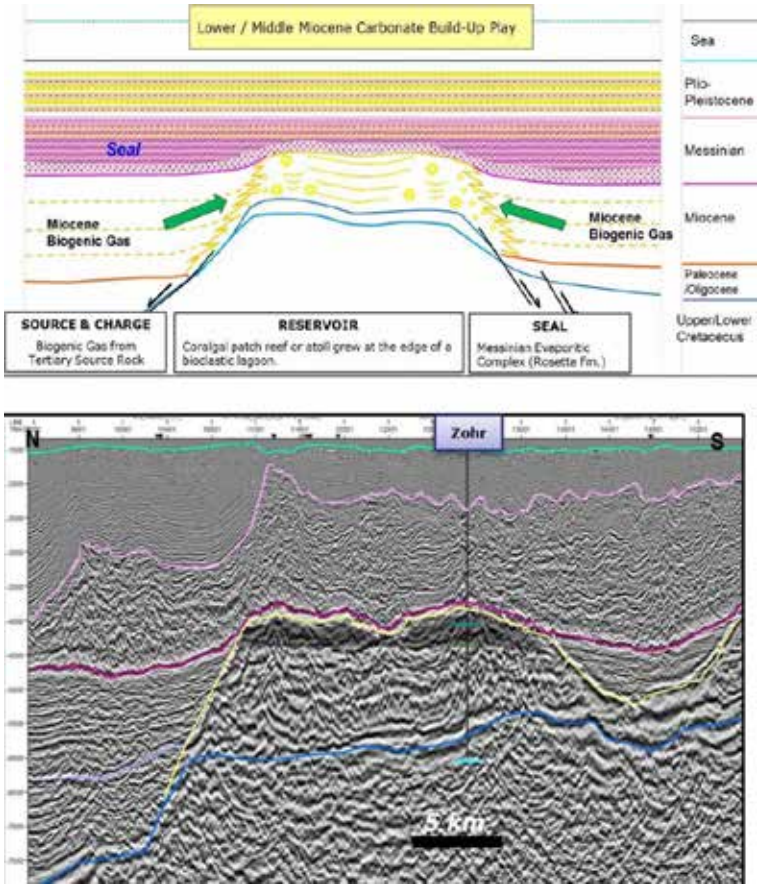


Map 4: A map display of tectonic structures for the East Mediterranean basins (Heredotus and Levantine Basins, which might have potential hydrocarbon reserves). Source: Petroleum Geoscience, Lyell Collection, 2012.

Before going too deep into the seismic interpretation and geological analysis of the region, it is better to note that Israeli gas discoveries and Cyprus' only proven gas find Aphrodite Field fall on Levantine Basin. By the way, it is important to memorize that the Aphrodite Field was discovered by Noble Energy along with Noble's Israeli discoveries, i.e. Cyprus did not intentionally had this discovery by itself. Additionally, there is no discovery in Heredotus Basin, yet but the fact that ENI had Zohr discovery on Nile Delta, Greeks and EU based petroleum giants have been excited about the potentiality of Heredotus Basin.

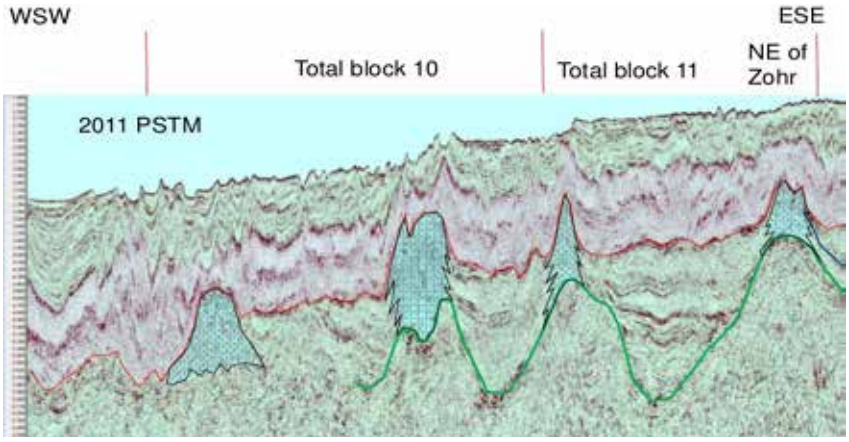
HEREDOTUS BASIN

Zohr discovery as outlined in Seismic Section 1 is an important discovery, however the gas source is biogenic, which means less valuable comparing to its thermogenic opponent but again its size is promising. Having seen similar structures to Zohr on seismics from the so called Cyprus EEZs escalated theories that Heredotus Basin has high potential of hydrocarbon reserves. Some of these similar structures are displayed in Seismic Section 2.

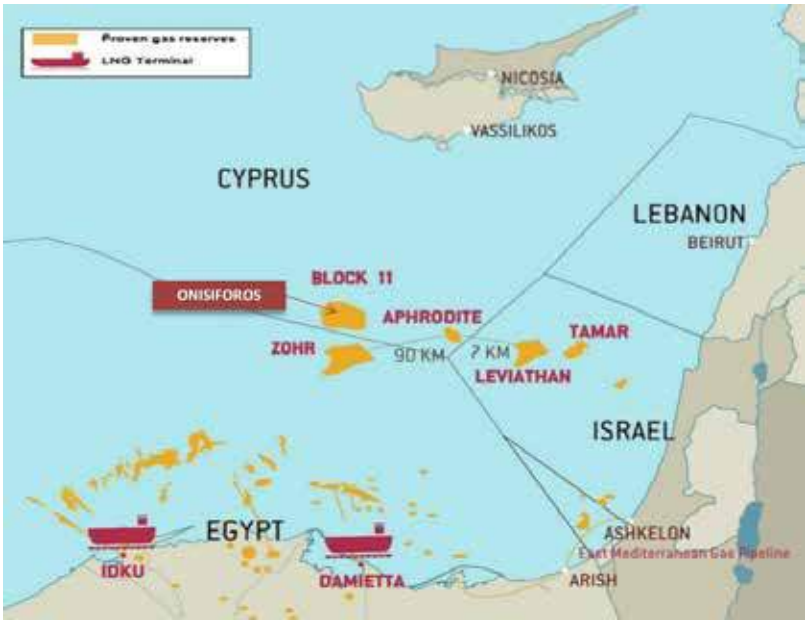


Seismic Section 1: Zohr discovery on seismic (bottom) and cartoon sketch of the biogenic gas reservoir structure (top). Source: http://africaoilgasreport.com/2016/12/geosciences/zohr-the-making-of-a-mega-discovery/

Evaluating Zohr's high gas potential and defining similar structures on Cyprus's EEZ, ENI seems to work hard to map leads and prospects in the region. Eventually, French Total has teamed up with Italian ENI to tap an exploratory well in Block 11 of Cyprus offshore. The main purpose of this cooperation is to test a theory that there might be a symmetrical prospect (Onisiforos) similar to or larger than Zohr in size within the Block 11. Current discoveries and potential Onisiforos prospect are shown in Map 5 to better visualize the regions known hydrocarbon potential.

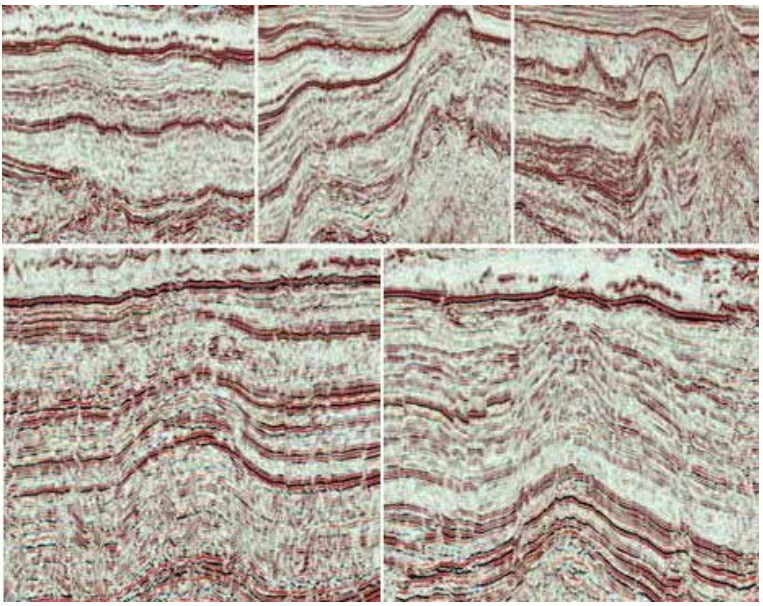


Seismic Section 2: Zohr look alike structures that excites explorers. Source: https://www.slideshare.net/AndyloannouVaroshiotis/levant-basin-neil-hodgson-spectrum-presentation



Map 5: Oil and Gas fields with recent discoveries in East Mediterranean and Nile Delta. Source: https://www.slideshare.net/SGT_Tsomokos/theodoros-kitsakos-the-midstream-challenge-in-eastern-mediterranean

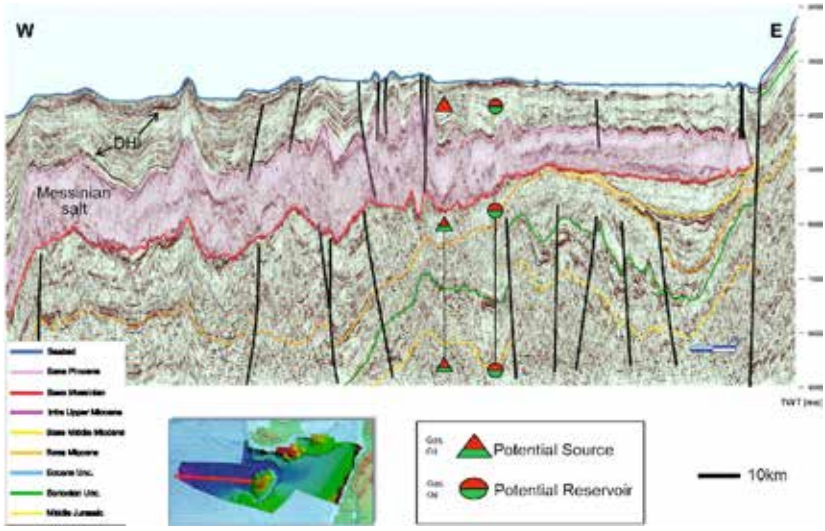
There are some other seismic evidences that makes experts believe that East Mediterranean has high hydrocarbon potential. A few examples are given on Seismic Section 3. Those structures may indicate potential reservoirs but it is not really wise to exaggerate such structures without having a reliable scale and tectonic history along with oil play scenarios.



Seismic Section 3: Promising structures that are caught on seismic over Heredotus Basin. No scale provided. Source: http://www.geoexpro.com/articles/2011/01/eastern-mediterranean-the-hot-new-exploration-region

It makes sense to mention that Eratosthenes Sea Mount (ECB) acts as a barrier between Heredotus and Levantine Basins (See Map 4). Seismic information from the Heredotus Basin implies presence of enormous tectonic activity in the region. Looking at a seismic section in the East (E) – West (W) direction is helpful to understand this tectonic affects in Heredotus Basin. The E-W section shot in the West of ECB is provided in Seismic Section 4. Seismic interpretation also indicates potential sources (triangles) and reservoirs (circles). Highlighted areas (pink) indicate Messinian Evaporates known as seal in the region. As it is seen, there is a small basin below Messinian Evaporates on the East of the seismic. Assuming that the necessary conditions for hydrocarbon generation are present, an organic matter rich source rock deposited in a small basin will only produce small amounts of hydrocarbon. That is why and plus the high drilling costs, this part of the Heredotus Basin should not be considered as a potential area. The rest of the section (especially the middle part of the section) indicates high tectonic activity that disrupts and entangles each possible reservoir element. In addition, sediments above the Messinian Evaporates shows signs of active tectonic phase that really complicates migration paths and reservoir formations. As a result, potentiality of the Heredotus Basin is highly questionable as it will require too much hard work and financial investment for testing a few structures to see if they are hydrocarbon bearing.

The whole excitement about Heredotus Basin stands unclear but within the light of the current evidences, the whole scam is built on attracting giant petroleum companies to invest and drill a few of the so called leads. Off course, if you do not have any valuable scientific evidence, naming a well after a Saint never changes the obvious!

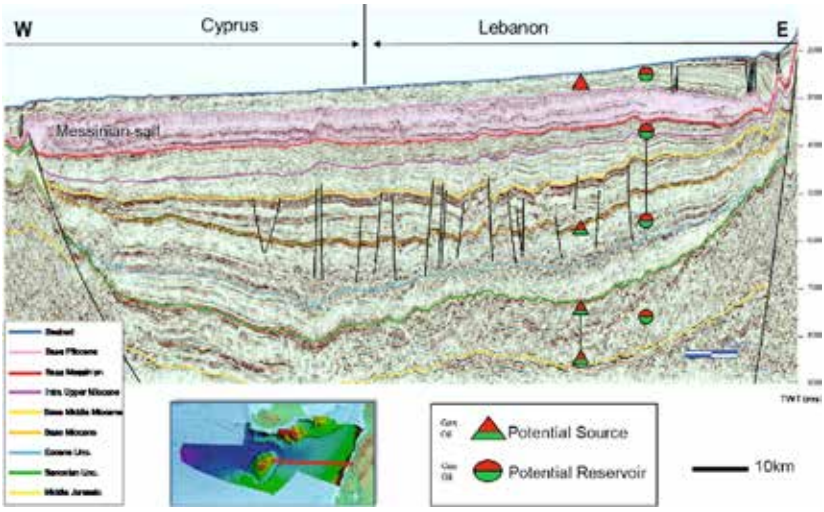


Seismic Section 4: East-West section display of seismic that is shot in the West of ECB. Source: Petroleum Geoscience, Lyell Collection.

LEVANTINE BASIN

Tectonic settings differentiate in the East of the ECB, where the Levantine Basin has been formed. It is quite possible to note that Levantine Basin tectonically seems a lot less disturbed in contrast to Heredotus. That is why, mastering the definition of reservoir elements and comprehension of migration paths from source rocks will not a big challenge as opposed to doing the same in Heredotus Basin, where characterizing the complete tectonic history is out of question.

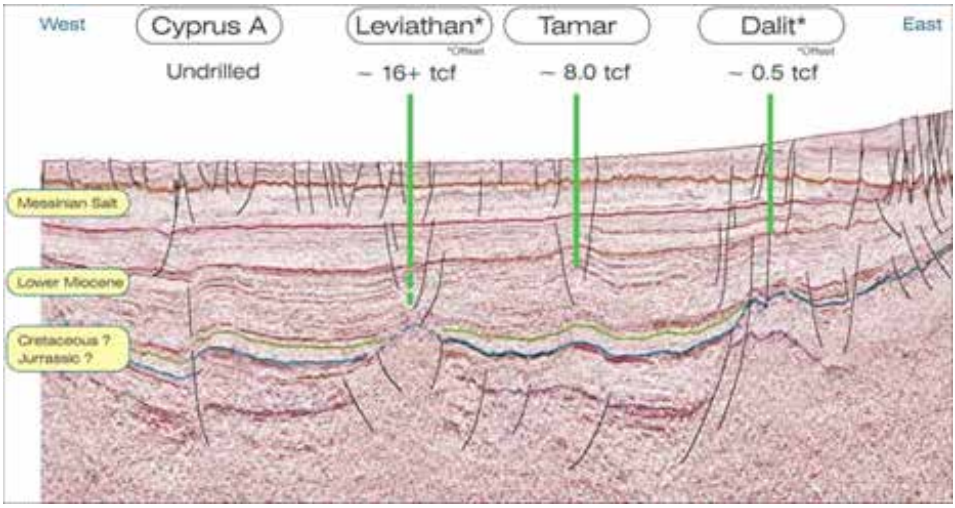
The discoveries such as Leviathan, Tamar and Aphrodite state that the basin's hydrocarbon potential is proven, source rock and reservoirs are present as well. Simplicity of the tectonic settings requires a genuine approach to estimate general characteristics of the basin. Seismic evidences give some insights to geological settings and tectonic history for hydrocarbon generation and plays in Levantine. Seismic Section 5 is gathered in the East of ECB. Assuming that the seismic interpretation is correct, thickness change in Cretaceous sediments between Jurassic (Yellow line) and Senonian Unconformity (Green Line) indicates a reversal in depositional settings in the basin. Eocene Unconformity (Blue line) suggests a calmer depositional environment but active tectonism still encompasses the sediments especially in the middle parts. The reversing occurs again during the Early Miocene (between Base-Orange and Base Middle Miocene-Yellow) and the basin gets another in the Upper Miocene. Note that tectonism is active throughout the sedimentation occurring in the basin due to the visibility of faults in the middle and both edges.



Seismic Section 5: East-West section display of seismic that is shot in the East of ECB and extends through the Lebanon offshore. Source: Petroleum Geoscience, Lyell Collection.

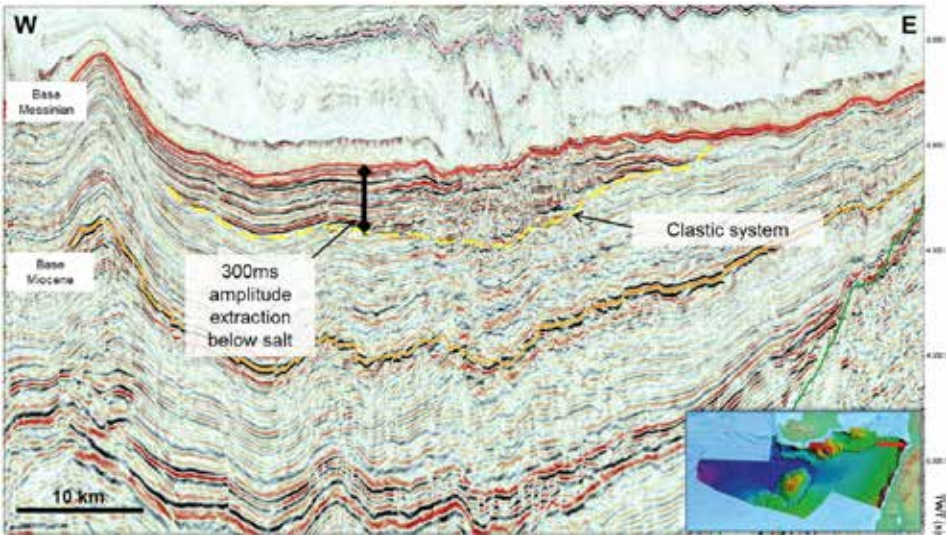
Keeping in mind that for an organic rich source rock being able to produce hydrocarbon, overburden pressure and temperature requirements should be met in accordance: The geometry of the Levantine Basin has been inverted a few times in geological chronology, which means foreseeing the changes in fault blocks, migration paths, reservoir geometry and tectonism that alter them are the key factors for successful hydrocarbon exploration studies. As a reminder, it is possible to mention that similar situation exists in Turkey's oil fields that include three different tectonic regimes interfering hydrocarbon plays and seriously altering reservoir components.

Resolving tectonic history along with hydrocarbon generation for each potential source and reservoir rocks from the Seismic Section 5 implies that general attitude of migration paths points eastward spreading. This means that structures toward the East of Levantine Basin has highest hydrocarbon accumulation rates. Israeli gas discoveries including Aphrodite Field shown on Seismic Section 6 prove such theory as the highest reserve was tapped on Leviathan Field. Tamar and Dalit fields with proven gas reserves extend toward the East. The Aphrodite Field (marked as Cyprus A in the section) has lower gas potential compared to that of Leviathan and Tamar.

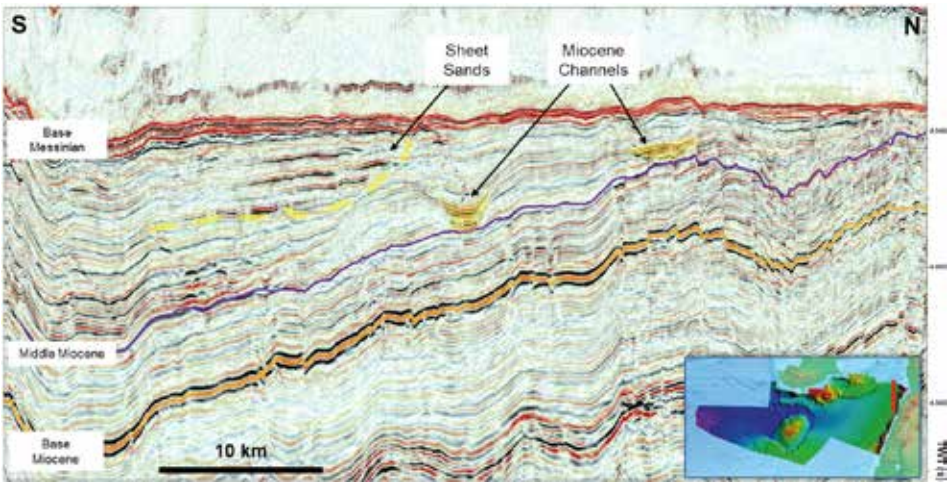


Seismic Section 6: East-West section display of seismic that shows Israel's offshore gas discoveries. Source: http://www.geoexpro.com/articles/2011/01/eastern-mediterranean-the-hot-new-exploration-region.

Seismic Section 7 and 8 belong to Lebanon offshore covering the North-West part of the Levantine Basin. East – West directed seismic suggests eastward Migration paths, which has similar trends with Israeli gas fields. North – South directed seismic points out that major paths for hydrocarbon migration also extends toward the North, which indicates that the Northeast part of the Levantine Basin has the highest hydrocarbon potential in the region. This fact, from the view of hydrocarbon exploration, gives Lebanon the highest priority among the other Mediterranean countries.



Seismic Section 7: East-West section display of seismic that is shot in the Lebanon offshore. Source: Petroleum Geoscience, Lyell Collection.



Seismic Section 8: North-South section display of seismic that is shot in the Lebanon offshore. Source: Petroleum Geoscience, Lyell Collection.

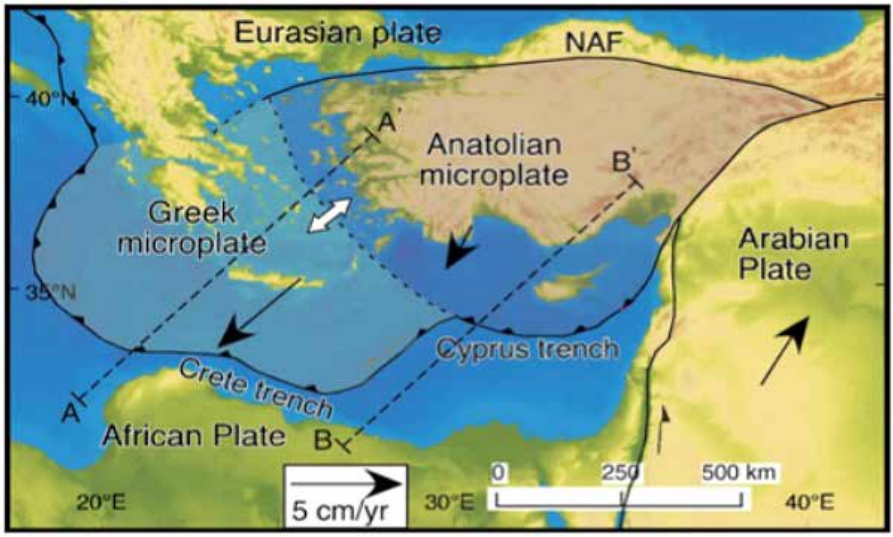
Lebanon having the highest hydrocarbon potential in Mediterranean has had to bear with international energy games and political crisis. Reelecting its president took about 3 years after resignation of the president in 2014. Many countries were involved in the political chaos suspending the bidding rounds for Lebanon offshore that finally ended after secret agreements made behind closed doors and president got elected in 2017. On the other hand, there has been no international dilemma for Cyprus, which alone indicates that there is nothing in Cyprus's EEZs to fight for!

PLATE TECTONICS

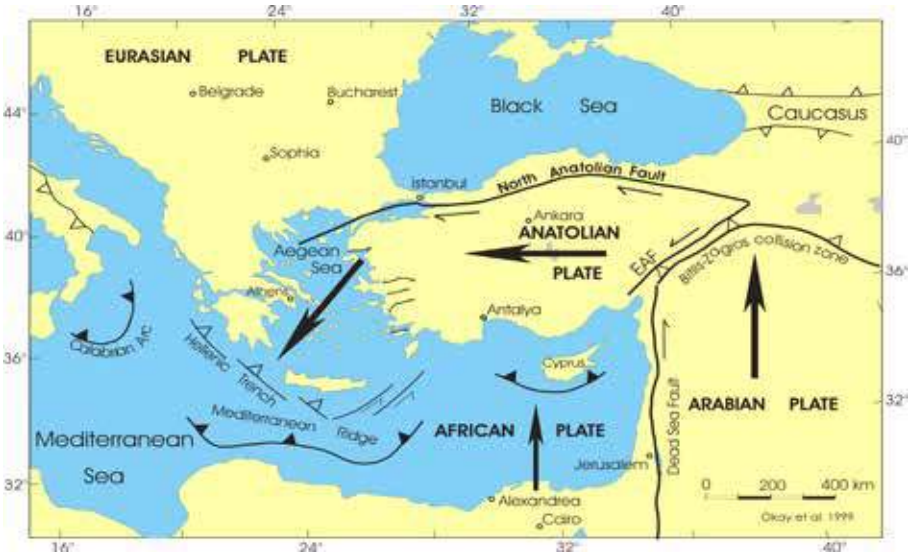
It makes sense to highlight the plate tectonics concept in the Mediterranean region since The Evil Triangle bases Cyprus Talks on Cyprus's so called gas reserves. The Evil's will is to unite Cyprus under Greek rule but plate tectonics suggests that Cyprus belongs to Anatolia, which is the homeland of Turks. Map 6 and 7 show two different versions of Mediterranean plates. Unable to claim Anatolia the Greeks are trying to make up a new plate for their selves by dividing Anatolian plate through the Aegean Sea. The Greeks tend to envisage that whenever they name something, it is theirs. Apparently, the truth is behind their imagination and the fact that they have to face the reality both in Cyprus and Anatolia. And even "Plate Tectonics" bitterly states that!

A serious advice to Turkey that it should consider using geological evidences through Cyprus Talks. It should also make sure each party at the talks understands that Cyprus is a part of homeland Anatolia and therefore, it can never be separated from Turks.

Additionally, assuming the Greek microplate is accepted, then the separation of Aegean Sea EEZs and islands should be over that plate boundary i.e. the islands left over Anatolian microplate should be delivered to Turkey.



Map 6: A Greek version of tectonic plates in the Eastern Mediterranean. Source: https://watchers.news /2012/01/28/increasing-seismic-activities-in-aegean-sea-greece-with-tectonic-summary/



Map 7: A true version of tectonic plates in the Eastern Mediterranean. Source: https://ideagirlseverestormpredictionswarnings.wordpress.com/2012/10/24/map-active-tectonics-in-east-mediterranean-sea-eurasian-plate-black-sea-north-anatolian-fault-anatolian-plate-arabian-plate-aegean-sea-african-plate-tectonic-movements-24-oct-2012/

After mentioning the hydrocarbon potential and the plate tectonics' properties, the total current potential and the situation of the region will be analyzed below.

COMBINED ANALYSIS

Now that detailed information in regard to the general picture in the Eastern Mediterranean from both the political and the geoscientific point of views has been given, the view of current export potential and economics is essential to complete the general evaluation of the region.

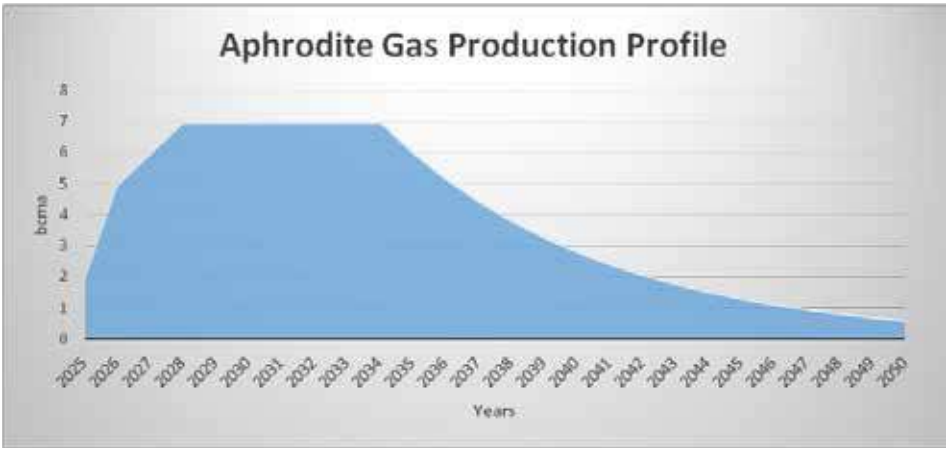
While evaluating the Cyprus Gas Corridor's export potential sight:

- To start with the farther resources, the transportation tariffs and the unit production costs of Iraq-Syria-Mediterranean Pipeline will be much higher than the EU's market prices. Hence, it will not be economic to transport Iranian gas from such a proposed pipeline. So, this option fails.
- Iraq is currently a gas importing country. There is a huge lack of gas supply and that's why there are always unfortunate electricity cuts in the country. Both the Central and the Northern governments are in the same situation. In the long term, with the development of the reserves, although it can be assumed that, the domestic demand will be able to be met and the remaining volumes will be exported; the export volume will not seem to be so high to create big dreams.
- Onshore Syria reserves does not exhibit important gas potentiality. Only the Syrian offshore is accepted to have some potential that requires evaluation and development and plus the ongoing conflicts would have to be solved in the country.
- Lebanon has an important offshore potential; however, it is too early to create a coherent plan for currently undiscovered reserves. But, in case of a huge discovery, EastMed Pipeline project again can be put on the table. As a matter of fact, Israel is waiting for the results of the exploration activities in Lebanon offshore to take an action on the solution of the offshore border conflicts within the two countries. And due to these plans Israel keeps to have good relations with the Lebanon Government.
- In Israel, although there is more than 1 tcm proved gas reserves, Israel's export potential is not as high as expected by considering the increasing volume of domestic demand. After adding the latest export sales agreements between Israel and Jordan or Palestine, this volume will be around average 3 - 5 bcma levels for a 15 years period. And this volume is not so attractive for huge markets to desire an expensive and difficult pipeline. (Source: http://www.energypolicyturkey.com/future-israel-gas-export-2050-turkey/)
- In Egypt, there is going to be around 18 -20 bcma gas export potential for 10 – 12 years. And this volume will be exported through the existing LNG facilities in Egypt. So, there seems no probability for Egyptian gas to contribue to the EastMed Project. (Source: http://www.energypolicyturkey.com/egypt-gas-export-potential-up-to-2050-regional-gas-policies/)

From the sight of the Cyprus Island, there is only one discovered gas field, named Aphrodite. Aphrodite is an offshore gas field with an average water depth of 1700 meters and an estimated reserve of around 115 bcm. According to the gas composition, hence being a dry gas reservoir, such as the Leviathan Gas Field in Israel, it is not easy

to liquefy the production for export purposes. That's why the commercial option in the current situation seems as the pipeline routes. The advantage of the field is its location. Hence, being so close to the Leviathan Gas Field, there is a chance of being developed together. So both fields' destiny can be accepted to be parallel with each other.

While neglecting the commercial and political issues, with some benchmarks and some assumptions, the Aphrodite's production profile can be estimated as shown in Graph 1.



Graph 1: Aphrodite Gas Production Profile (Source: https://www.tespam.org/muzakere-edilen-bi-zim-kibris-enerji/)

Note that: Due technical and financial difficulties, the field in the best case is estimated to be taken into production in 2025. In 3 years the plateau rate, 7 bcma, is assumed to be reached. And the plateau rate is estimated to be conserved for 7 years.

By adding the island's demand into the equation, the current total export potential will be around 6 bcma for around 13 years.

To sum up, coherently, the total gas export potential of the Eastern Mediterranean is around 10 bcma through a proposed pipeline. Which is the whole Israel's and Cyprus Island's gas. And such a volume is not so attractive for investments.

Only Lebanon's potential discoveries may change the dynamics.

Moreover, from the pipeline economics sight;

- Proposed EastMed Pipeline project, with a huge cost more than 20 billion $, by benchmarking with the current TAP's costs, will not be feasible for such a small size export potential. (Source: https://www.tespam.org/dogu-akdeniz-eastmed-boru-hatti-projesi/)
- Then, the last choice for such a corridor will be through Turkey option!

As a result, from the political, technical, commercial and export potential sights the proposed Cyprus Energy Corridor does not seem to be coherent or feasible. Only Lebanon discoveries may change the dynamics.

CONCLUSION

Energy has the top priority for developing and developed countries, which is why having control over the vast energy resources and transportation routes qualifies those countries to be the authority of the world. Developing countries require more energy to complete their transaction to a developed country. They need reliable and safe resources to accelerate the progress but this costs too much as developed countries have already secured a monopoly on the global energy trade. To make even a small change in the global energy monopoly, developing countries have to defy The Evil Triangle and challenge them to release the grip on global energy trade.

Off course, The Evil Triangle will try its best to grasp of the global trade but they will never be able to secure it forever because changes in international balances (financial and military powers shifts) have already begun that will eventually weaken the West Bloc's authority of the global energy game.

The Evil acts like it is trying its best to fulfill Israel's ambitions to establish "The Great Israel" but their main aim never completely matches to that of the Jews. They have already been controlling the region and its vast hydrocarbon reserves, over which they have built their empires. Why would they just hurdle their empire by empowering Jews in the region? Perhaps, Jews are not as smart as the whole world thinks they are!

The Greeks are after the glory of more land from the Ottoman territory such as Cyprus and perhaps more in the future if Kurds do their duties to dismantle Turkey and Iran, giving them opportunity to fulfill Greek ambitions of invading Anatolia. If all goes well for the Greeks, they will most probably be subjugated to certain terms and conditions for allowing the pipeline through Greek lands. Perhaps, some little amounts will be offered for direct transport and some gas for internal use. Plus, they will always be an Orthodox puppet of the Catholic puppeteers.

Turkey is one of the involved countries in both East Mediterranean and Middle East. A Muslim and probably the key country to settle each argument that can be brought in both regions either militarily and politically. Even small changes in the current balance will create new opportunities for Turkey as in being the "Energy Center" it has been longing for. Europe, on the other hand, seems to be independent of Turkey's interference on its energy routes and supplies since they are unwilling to cooperate with a country that they are trying to disorient.

The plans for dismantling Turkey can be summarized as reducing its influence in both regions such as cutting its ties with other Sunnis in Arabic Peninsula by a Kurdish Corridor, creating conflicts within Islamic sects by sedition, terrorism, bureaucratic puppets that have been loyal to the West, and at last, embracing Turkey's national waters in Mediterranean by founding a unite Cyprus governed by Greeks.

Plans are simple but the application of each plan gets on one's nerves since it requires too many manipulations through the media, buying too many traitors and bureaucrats both internally and externally, creating terrorist groups to threaten the innocent people that will pressure governments to stop the cruelty if bureaucrats and traitors fail, codifying embargos and imposing financial sanctions to suppress any kind of opposition and the list goes on. However, there has be to a reason to plot all the plans over those

regions. A reason that gets everybody's acceptance as everything is happening there is a natural outcome of the human needs. And that reason has been named as "Energy" and "Energy Corridors" within the last centuries.

In conclusion, Cyprus Energy Corridor powered up with Kurdish Corridor is an international energy joke made up by The Evil Triangle. It has no bases at all but The Evil has to play along to make Turks believe and leave Cyprus and Mediterranean. Turkey should being delusional and start adopting new strategies and plans that shy away from the so called great hydrocarbon potential of the Mediterranean. A personal note to self: Turkey's hydrocarbon potential in Mediterranean might just be higher than the rest! Turkey has to rephrase Cyprus Talks agenda over solid information and to pressure the other parties to acquire the same course.

REFERENCES

- Stelios Karsanevakis et al., "Marine Conservation Challenges in an era of economic Crisis and Geopolitical Instability: The Case of the Mediterranean Sea", Research Gate, July 2014, accessible from https://www.researchgate.net/publication/264563464_Marine_conservation_challenges_in_an_era_of_economic_crisis_and_geopolitical_instabilityThe_case_of_the_Mediterranean_Sea
- Wikiwand, "Second Crusade", accessible from http://www.wikiwand.com/en/Second_Crusade
- Astral Newz, "ISIL … That Caliphate Thingie", accessible from http://www.astralnewz.com/inforeportsthree/thecaliphate.html
- "Total, Eni to start drilling off Cyprus", The Oil & Gas Year, accessible from http://www.theoilandgasyear.com/news/total-eni-to-start-drilling-off-cyprus/
- Dave Peace, "Eastern Mediterranean – The Hot New Exploration Region", GeoEx Pro-Seismic Foldouts Middle East Vol. 8, No. 1, 2011, accessible from http://www.geoexpro.com/articles/2011/01/eastern-mediterranean-the-hot-new-exploration-region
- Neil Hodgson, "Petroleum Systems of the Levant", Spectrum, 2016, accessible from https://www.slideshare.net/AndyIoannouVaroshiotis/levant-basin-neil-hodgson-spectrum-presentation
- Marco Alfieri, "The Backstory of the Largest Hydrocarbon Field in the Mediterranean", Africa Oil+Gas Report, Geosciences, December 2016, accessible from http://africaoilgasreport.com/2016/12/geosciences/zohr-the-making-of-a-mega-discovery/
- Petroleum Geoscience, Lyell Collection.
- Alain Bruneton, Elias Konofagos and Anthony E. Foscolos, "The Importance of Eastern Mediterranean Gas Fields for Greece and the EU", Pytheas Market Focus, January 2012, accessible from https://www.slideshare.net/AndyIoannouVaroshiotis/east-mediterranean-gas-fields
- Theodoros Kitsakos, "The Midstream Challenge in Eastern Mediterranean", EastMed Energy Roundtable, 2017, accessible from https://www.slideshare.net/SGT_Tsomokos/theodoros-kitsakos-the-midstream-challenge-in-eastern-mediterranean
- "Map Active Tectonics In East Mediterranean sea eurasian plate black sea north anatolian fault anatolian plate arabian plate aegean sea african plate tectonic movements", acces-

sible from https://ideagirlseverestormpredictionswarnings.wordpress.com/2012/10/24/map-active-tectonics-in-east-mediterranean-sea-eurasian-plate-black-sea-north-anatolian-fault-anatolian-plate-arabian-plate-aegean-sea-african-plate-tectonic-movements-24-oct-2012/mapactivetectonicsineastmediterranean-sea-eurasian-plate-black-sea-north-anatolian-fault-anatolian-plate-arabian-plate-aegean-sea-african-plate-tectonic-movements-24-oct-2012/

- "Increasing seismic activities in Aegean Sea, Greece (with tectonic summary)", Featured Articles-Geology-Seismic Activity, The Watchers, accessible from https://watchers.news/2012/01/28/increasing-seismic-activities-in-aegean-sea-greece-with-tectonic-summary/

QATAR CRISIS AND ENERGY

Oğuzhan AKYENER
Sezayi TOPRAK

1. INTRODUCTION

The crisis started between Qatar, which has the third largest natural gas reserves and the biggest LNG supply capacity, and the block of Saudi Arabia, Egypt and the UAE and its impact continues in all over the world.

This block with Bahrein, Yemen, Libya's Tobruk Government have accused Qatar as the financer of terrorism and made the decision of ceasing all relations with Qatar as a reaction.

The fact that this development occurred right after Trump's visit to Saudi Arabia where a weapon sale agreement was signed and this process is supported by many Western institutions and countries creates some questions.

In this context, answers for those questions below, potential impact of energy to this process and the results created by this process will be examined:

- What is the problem between Qatar and the other countries?
- Did they have this problem before?
- What is relation of the US and Israel with this process?
- Where is the place of energy in this process, by taking into account that Qatar is one of the most important country in the world?
- What is the relation of Turkey with the process by taking into account other developments in the Middle East?
- Does it mean a step towards Iran?
- Is Turkey's strategy correct?

2. OVERALL ANALYSES OF THE PROCESS

In this part, the crisis and the process will be analyzed by asking some questions and answering them shortly.

What is Qatar's Administration Accused of?

Qatar's administration is accused of supporting terrorism and providing financial support to some terrorist groups. In this context, in particular, the most important problem between Qatar and Saudi Arabia-Egypt is that Qatar has supported the Muslim Brotherhood overthrown by military coup in Egypt. Especially, Saudi Arabia and the UAE, financed this military coup with the directives and supports of the US and Israel. From another perspective, it may well be claimed that Sisi and his supporters can be called as terrorists opposite to the claim that the Muslim Brotherhood is a terrorist group since Mursi was a legally elected president by the public. Nonetheless, this injustice process is still prevalent since those are regarded as terrorists which is the claim of global actors in contemporary world.

- In addition to its support to the Muslim Brotherhood, accusations stated below have been artificially created to get the supports of other Arabian countries and global public:
- The fact that Qatar did not support American discourses against Iran and therefore, it looks like that Qatar is in line with Iran, which is regarded as the center of terrorism for the US.
    - Thereby, since it is in line with Iran it is claimed that Qatar:
    - Supported Husi militants in Yemen,
    - Became the financer of Shia incidents in Kaif,
    - Involved in Shia riots in Bahreyn,
    - Supported Al-Qaeda, ISIS and Hamas.

How much realistic these accusations are?

The accusations can be examined in four categories:

1. It supports the Muslim Brotherhood, which was a legal authority in Egypt before the coup,
2. Husi, Katif and Bahrain issues, which are claimed to get Arabian countries' support by linking to Iran and Shia world,
3. Al-Qaeda and ISIS receiving international public support,
4. Hamas, which was especially added in this accusation bundle by Israel.

Only the first and fourth categories can be associated with Qatar. Other categories (the second and third ones) may be regarded as they are included to receive support of some stakeholders. As it is known, Saudi Arabia supported ISIS with the US's directive during the struggle process with Al-Qaeda and Shia government in Iraq. As a short reminder, everybody knows the history behind Al-Qaeda that US created it to fight against Russian intrusion in Afghanistan and Saudi Arabia financed it. As a matter of fact, they still continue to support Al-Qaeda but today, US has made a huge propaganda about Al-Qaeda militia joining ISIS ambitions in Iraq and Syria. US had tried to claim that both ISIS

and Al-Qaeda were the same terrorist groups but that was a simple deceit because US tries to hide the fact that it purchases terrorist groups to run errands for them. Since US hides its masterpiece (terrorism), there has to be a country or countries to shoulder the blame such as Qatar in the last Saudi Arabia-Egypt-UAE triangle. Furthermore, it can be concluded that the global actors may accuse of other countries in the future to be the supporter for terrorism like in this Qatar example.

It is known that the US is active in this process, why?

New American administration, oil cartels who supported this new administration, and the steps taken for the new world order should be examined. It is because the West, which was weakened or was not able to counterstrike against the rise of the East, had to take some steps against China, which is regarded as an everlasting threat by the West.

Moreover, the most important threats which are claimed by new American administration are China's trade and monetary policies, Iran, North Korea and other so called terrorist groups. Also, as it is known, the US's attempt,

- To continue its active pursue in the Middle East without spending any money,
- To increase the battle between Shia and Sunni, which is thought to reshape the region,
- To use Saudi Arabia, Egypt, and the UAE as major pawns,
- To make Turkey, which is another active power in the region, under control by supporting PYD and YPG against other terrorist groups such as ISIS, which are established and weaponized by the US itself.
- By taking into account the US's attitude and goals, with the help of the crisis started by Saudi Arabia, the UAE and Egypt, the US aims to:
- Warning Iran before a potential unexpected Iranian move,
- Pursuing Qatar, which will be affected most from a military attack to Iran,
- Bringing Israel into safety,
- Taking a new step against to Turkey, in addition to current Syrian policy, to make Turkey isolated and decrease Turkey's prestige among Arabs and damage Turkey's economy,
- Realizing huge amount of export and fund production of new technology weapons by selling old technology weapons to these countries in very high prices,
- Giving a message to Russia, which is attempting to be active and to China, which is increasing its commercial operations that tends to suffocate the US being the leading power in this region,
- Overall, keeping its activeness and shape its projects with more blood and chaos without spending money by using these related pawns,
- Lastly, get benefit in terms of asserting dominance in the world's LNG market.

These reasons are enough for the US to get involved in this process.

If these accusations are for Iran, why did the step not taken directly towards Iran?

It is because Arabs are wanted to be used in a potential military attack against Iran. The leaders of Arabs would be Saudi Arabia and Egypt. Qatar needs to stay away from this attack since it knows that it is the country that will be affected worst by a military attack against Iran.

Under these conditions, before a military attack against Iran:

- Saudi Arabia and Egypt should unite Sunni Arab world to become the leader of the Sunnis,
- Turkey should be discredited in Arabs' views since Turkey has been support ing Qatar,
- Countries such as Saudi Arabia should be made stronger by taking their money,
- Other Arab countries which do not support a potential attack to Iran should be convinced,
- Shia population in countries such as Qatar, Yemen, Bahrein, Kuwait, Iraq, Syr ia, the UAE and Saudi Arabia should be suppressed and diminishing Iran's im pact in these countries,
- Support of international public opinion should be guaranteed under the name of tackling terrorism,
- An image of bloody struggle among Islamic countries should be granted,
- The balances should be kept and basis for a condition under which world peace can be granted should be built with Western timely intervention to these circumstances,
- Iran should be pressured more by providing supplies needed before a poten tial war.

Thus, Qatar is only a fore-step. Iran is the second one on next phases.

What are the other problems between Qatar and Saudi Arabia, Egypt and the UAE?

Firstly, there are some troubles between Saudi and Qatar tribes from the past. Furthermore, the main issue is to end the Muslim Brotherhood completely. For this reason, it is essential that financial and political supports of Turkey and Qatar to this group should be ceased completely.

Furthermore, especially the UAE and Saudi Arabia do not like that the central US military base is in Qatar. In addition, Qatar criticized Saudi Arabia, which contributed to forming the fundamentals of Al-Qaeda with Wahhabi thoughts and funded it with the orders of US in the 9/11 process. That increased the hostility between them.

Wil be there any military attack to Qatar?

Because of the reasons stated below, there will be no military attack:

- Presence of significant US military power in Qatar,
- Any damage to this military power is unacceptable and it is costly to move this military power to other places,
- Qatar's fair attitude,
- The goals could be achieved by keeping this intermediator role and the crisis alive,
- The real target is not Qatar,
- Going too far in any potential intervention which would result reaction of international public opinion may mean not to accomplish in the aims against Iran.

What are the goals against Turkey in this process?

One of the national security strategy of the US and some Western countries is to make Turkey, which has increased its activities by moving independently, and aiming unwanted international goals, weaken and be under control, diminish its active power. It is because Turkey has the potential to change international balances with its infrastructure, activity areas due to its historical heritage.

Gezi incidents, December 17-25 events, bloody military coup attempt and PKK, ISIS, YPG-PYD attacks, are the attempts to isolate Turkey and bend its ambitions in Syria. Economic and political attacks are the interventions of the West by considering this potential power of Turkey.

Turkey has been successful in all these attacks in spite of some loss.

Attempts in Rakka and weaponizing terrorist groups, in this scope, are all part of hidden projects against Turkey.

Especially, before the crisis process it was arisen with the e-mail messages between the UAE and some individuals and institutions, which evidenced that the UAE has supported bloody military coup attempt in Turkey. In the crisis process, this development resulted in damage of the relationship between Turkey and the UAE and Saudi Arabia, which, in fact, made Turkey to value Qatar's point of view.

May Tukey be the main target and threat like Iran? May it be declared as a terrorist country?

The current strategy of the US and West is to control the region with internal struggles and without spending any money. In this context, the most important card is a possible dispute between Sunni and Shia. Their targets against Iran are obvious by organizing some Sunni pawns. However, there is no big force they can put up against Turkey, which

is the most powerful country in its region. From this point, it is understood that they will not use Turkey against Iran. Thus, it looks like that Turkey will not be one of the main targets and will not be declared as terrorist country before,

- Establishing a strong Kurdish state in Syria,
- Combining this state with Northern Iraq,
- This new state will have an infrastructure to fight Turkey,
- Ending Turkey's positive image in other Sunni regions,
- Ending threat of Iran, which is another strong country disapproving a Kurdish state,
- Establishing an interior struggle and chaos environment in Turkey after accomplishing above aims.

Nonetheless, they will continue to create a public opinion such that Turkey would have been supporting terrorism by using short and informal speeches.

How will the Crisis Process continue?

It will continue in this format until Qatar accepts the claims. Although some countries such as Kuwait, which is supported by Turkey undergo peacemaker, it looks like that the role of peacemaker will be brought to major play makers. Hence, it will be easier for these play makers to spread the perception of that Turkey's power is not enough and they are the dominant power of the region.

A close combat with Qatar, which will definitely upset all the balances, will not be predicted by considering main targets.

In the next part, this crisis will be examined from the energy perspective.

3. QATAR CRISIS AND ENERGY

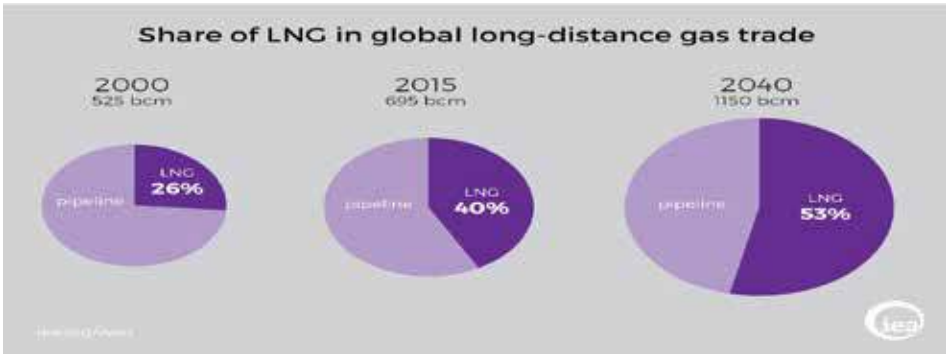
It is not correct to connect the main reason of the Qatar crisis to energy. Nonetheless, energy issues have some effects in the crisis process rather than they are the main reasons by underlining the importance of scientific approach and multi criteria analyses in such issues.

In this part, the effects of energy to the related process and the impact of the related process to the global energy policies will be analyzed after examining and interpreting some graphics which help us understand related markets from some reports.

Related Graphics

The first graphic taken from the EIA shows a rise of LNG share in the global natural gas trade markets. It can be interpreted from the Graphic 1 that LNG trade share will be higher than natural gas trade via pipeline in 2040s and it will increase to 1150 billion m3/year.

LNG share will increase gradually in the natural gas trade, which has a significant place in the global energy. Thereby, the competence in energy strategies will move to LNG.

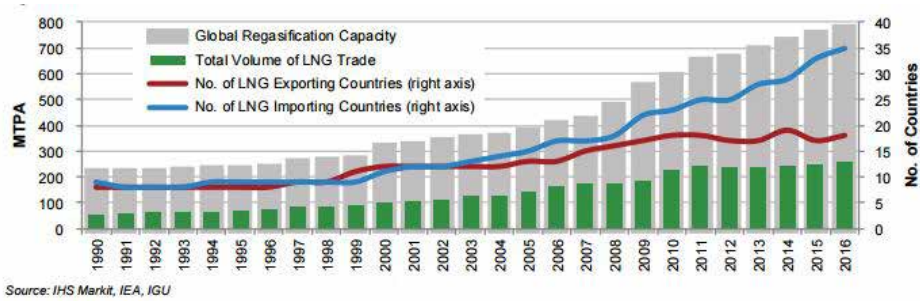


Graphic 1: LNG share in the global natural gas trade markets (Source: IEA)

Graphic 2 shows total LNG trade volume and the global gasification facility capacities, in equivalent units of annual million tons of oil. Moreover, the number of countries which import or export is included in the graphic.

It can be interpreted from the graphic that existing gasification capacities have more significant gaps than trade volumes. In other words, these gaps could be filled if resources were provided. In addition, the trade volume, technical capacity for import and the number of importer increased.

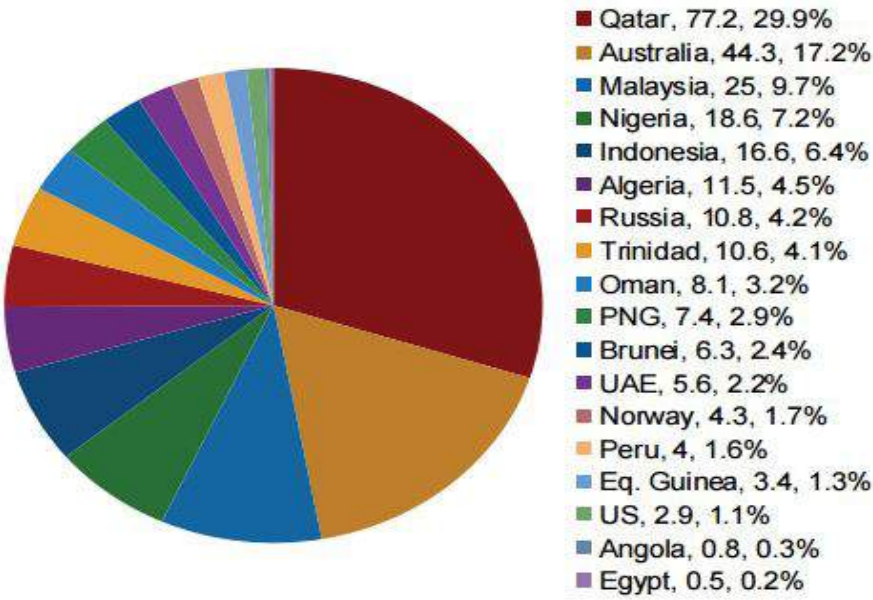
This situation is important in order to explain the Graphic 1, as well.



Graphic 2: LNG trade volume and the global gasification facility capacities (Source: IGU World LNG Report – 2017 Edition)

Graphic 3 shows the LNG exports of the related countries and their share in aggregated trade volume in 2016 in million ton.

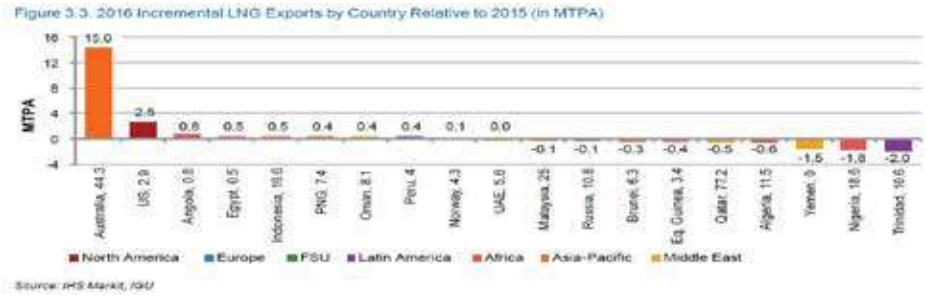
It can be understood from Graphic 3 that Qatar is the leader in terms of world LNG trade with nearly 30 % share. The next one is Australia and the US, Egypt and the UAE which are the actors of the crisis are also in the table.



Graphic 3: The LNG exports of the related countries and their share (Source: IGU World LNG Report – 2017 Edition)

Graphic 4 shows the change in LNG exporter countries' exports in 2016 relevant to previous year.

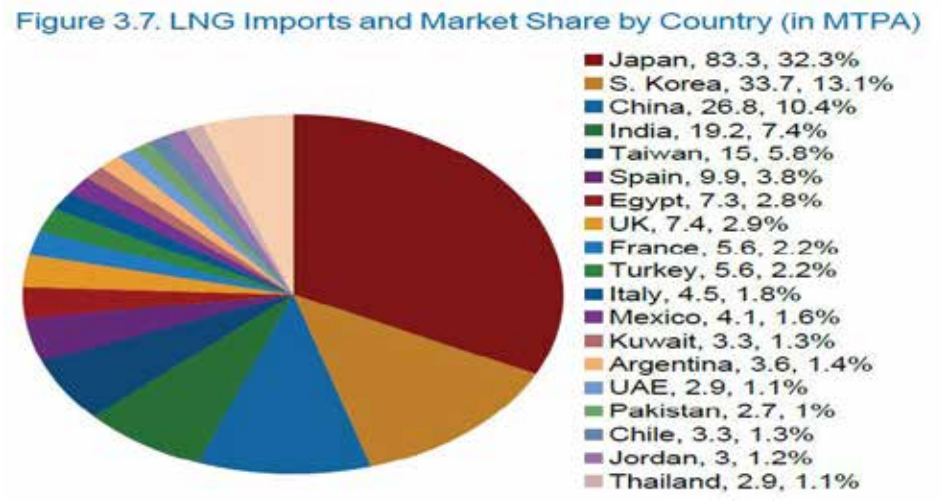
It can be understood from this graphic that there is an increase in Australia and the US.



Graphic 4: The change in LNG exporter countries' exports between 2015 and 2016 (Source: IGU World LNG Report – 2017 Edition)

Graphic 5 shows the major LNG importer countries, their share in global market and the quantity of LNG imports.

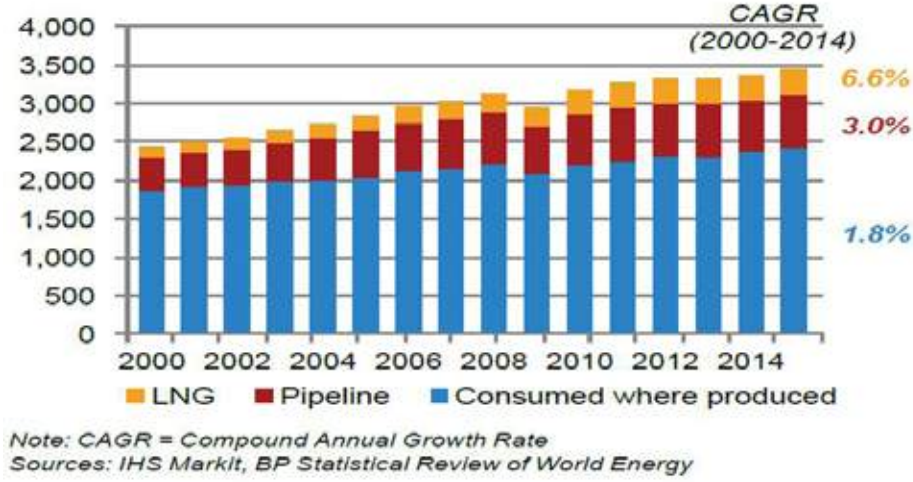
It is understood from the graphic that the biggest LNG importer is Japan. The next one is South Korea. Turkey is in the table, as well.



Graphic 5: Importer countries' share in the world LNG import in 2016 (Source: IGU World LNG Report – 2017 Edition)

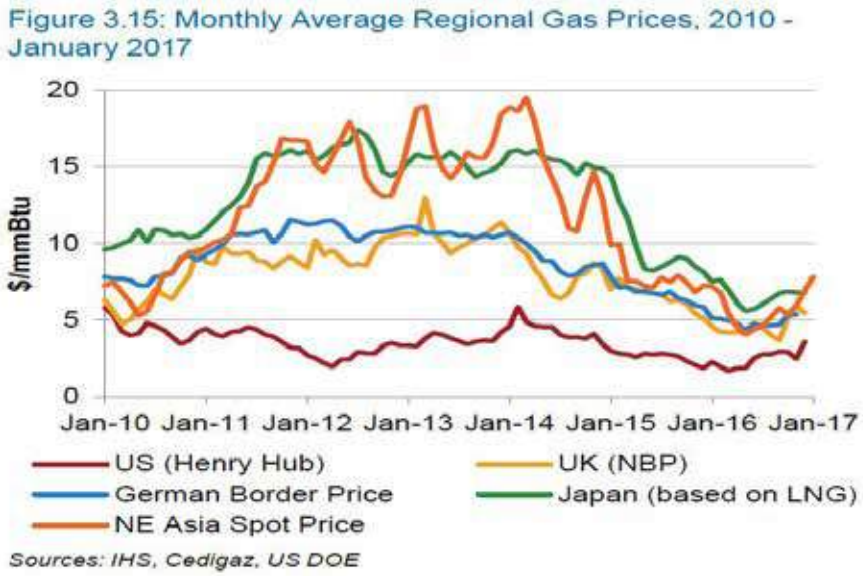
Graphic 6 shows ratio of consumption of natural gas in producer countries, ratio of its export via pipeline, ratio of supply in the form of LNG and increases in these ratios.

It can be understood from this Graphic that the largest increase is in LNG export and item is internal consumption.



Graphic 6: Ratios of world natural gas consumption and export (Source: IGU World LNG Report – 2017 Edition)

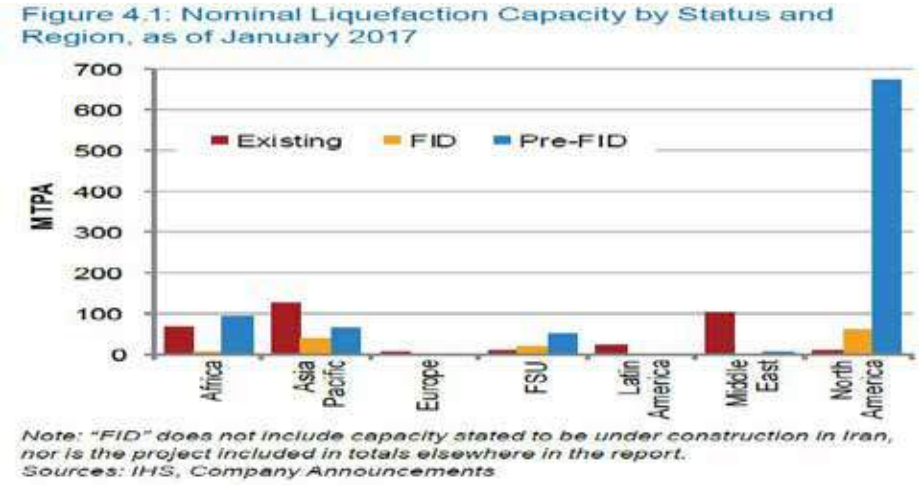
Graphic 7 includes monthly natural gas price averages in different regions/markets. It can be understood from this graphic that Henry Hub in the US is the market which has the cheapest natural gas price. The prices in the UK and Germany are similar to each other.



Graphic 7: Natural gas prices in different markets (Source: IGU World LNG Report – 2017 Edition)

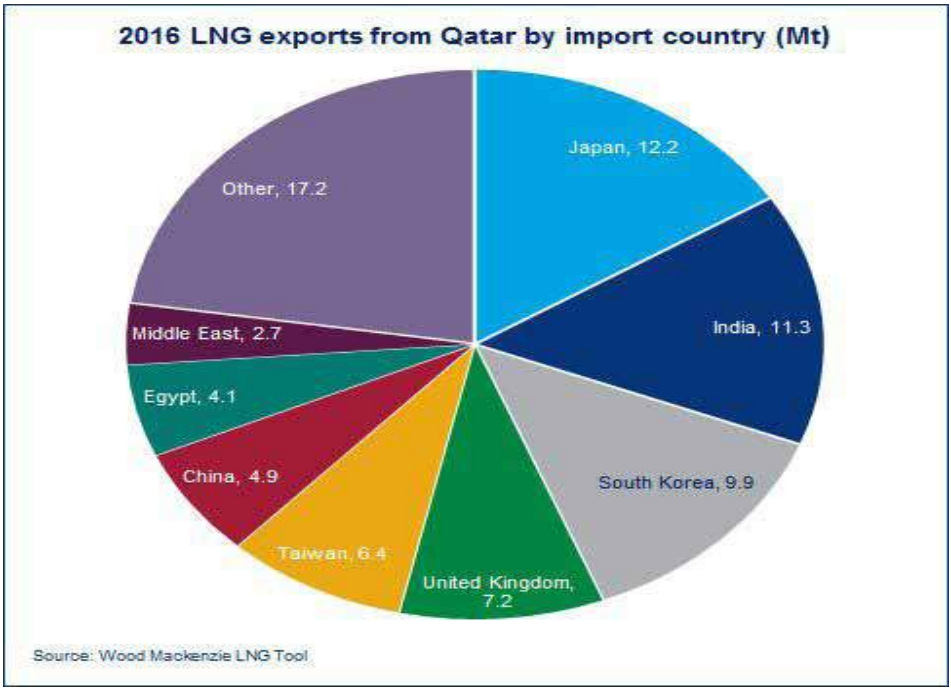
Graphic 8 shows LNG liquefaction facility capacities which are existing, in which investment decisions were made or are being made.

The increase in LNG liquefaction facilities in which investment decisions are being made in North America shows US desire to gain dominance over global LNG markets.



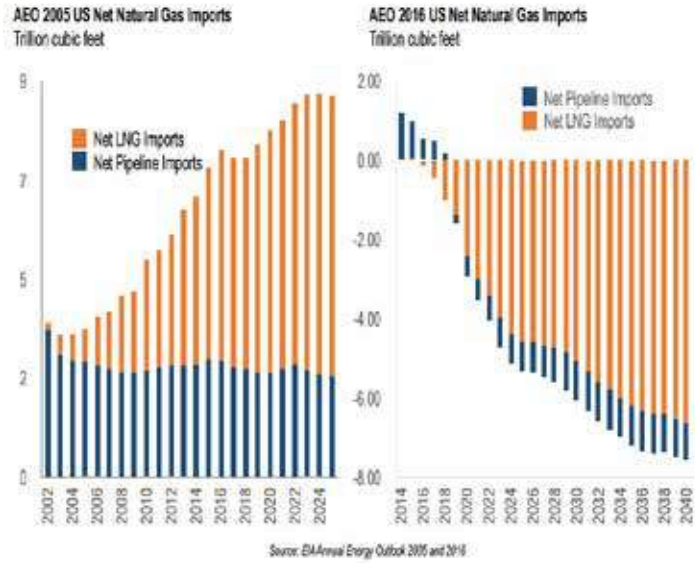
Graphic 8: Newly establishing LNG liquefaction facilities in different regions (Source: IGU World LNG Report – 2017 Edition)

Graphic 9 shows the countries Qatar exported LNG in 2016 and export quantities in million tons. It can be understood that the most sufferer countries from a supply shortage are Japan, India, South Korea and the UK respectively. These countries are in US market target in short run.



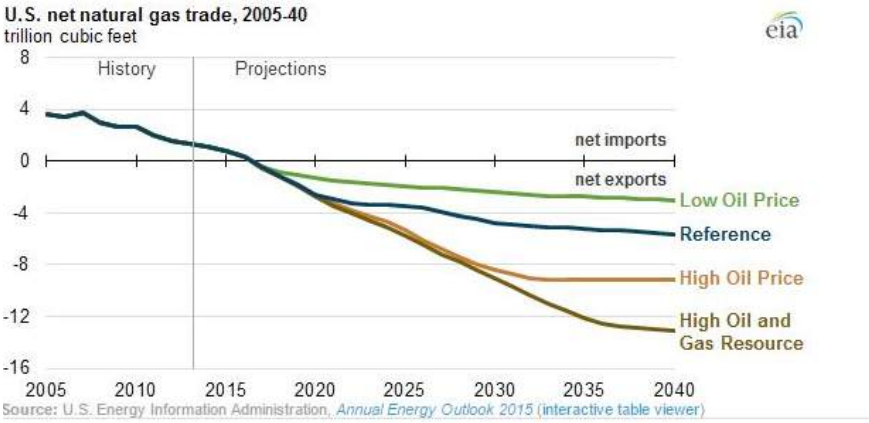
Graphic 9: Qatar's LNG exports in 2016 (Source: Wood Mackenzie)

Graphic 10 shows the projections of US natural gas import which can be understood from the increase in the planned facility capacities. It shows that the US tends to export LNG significantly.



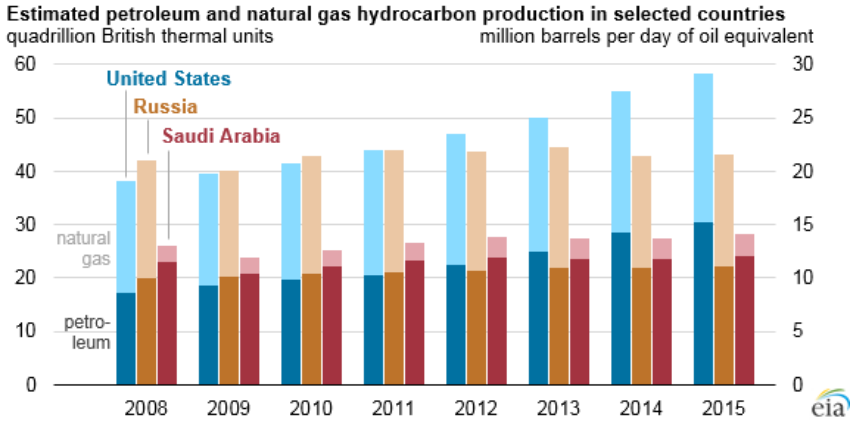
Graphic 10: US net natural gas imports (Source: EIA)

Graphic 11 shows the change in US natural gas export ratios according to different oil price projections. Thereby, high oil prices and natural gas prices are needed to develop and produce unconventional sources which are produced costlier than conventional sources and major part of US natural gas production.



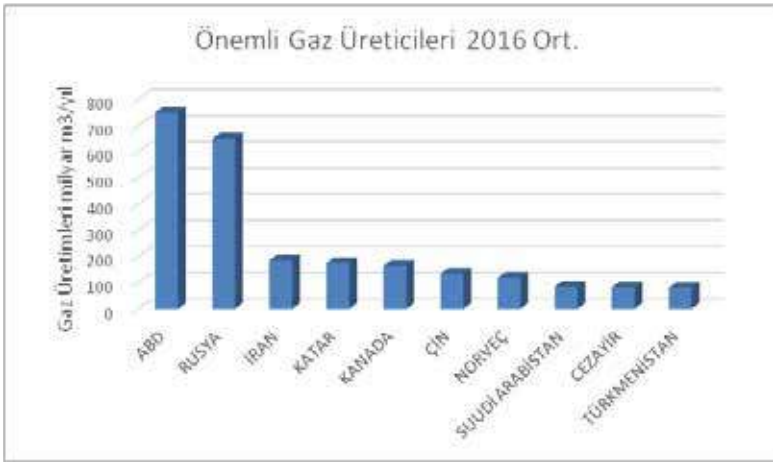
Graphic 11: US net natural gas trade (Source: EIA)

Graphic 12 shows that the US is the leader country in terms of oil and natural gas production. Though, high consumption relative to these production quantities limits its efficiency to become a net exporter.



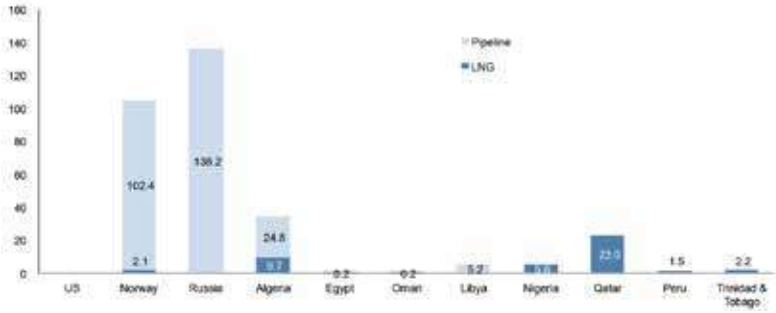
Graphic 12: Estimated petroleum and natural gas production in selected countries (Source: EIA)

Graphic 13 shows the order of major natural gas producer countries based on their 2016 average production.



Graphic 13: Major natural gas producer countries (Source: TESPAM)

Graphic 14 shows the quantity of natural gas import of the EU in 2013 in types of LNG and pipeline. As it is seen, the leader is Russia, next Norway, Nigeria and Qatar. Qatar will be the most significant competitor in these markets for the US which targets EU markets as an LNG exporter.

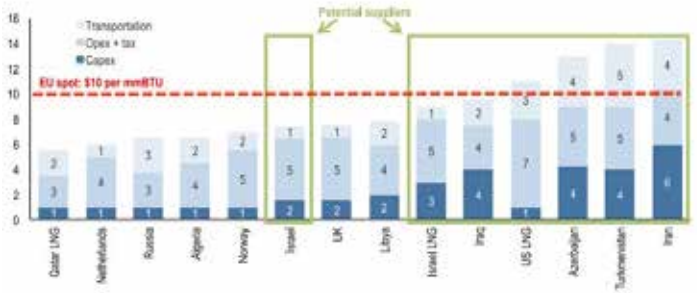


Graphic 14: EU natural gas imports in 2013 (Source: BP) (Units: billion m3)

Graphic 15 shows natural gas unit cost of selected countries when they transfer to the EU by including production, operation, tax and transportation costs.

It can be understood from the graphic that no other LNG supplier country has a chance to become a price competitor against Qatar.

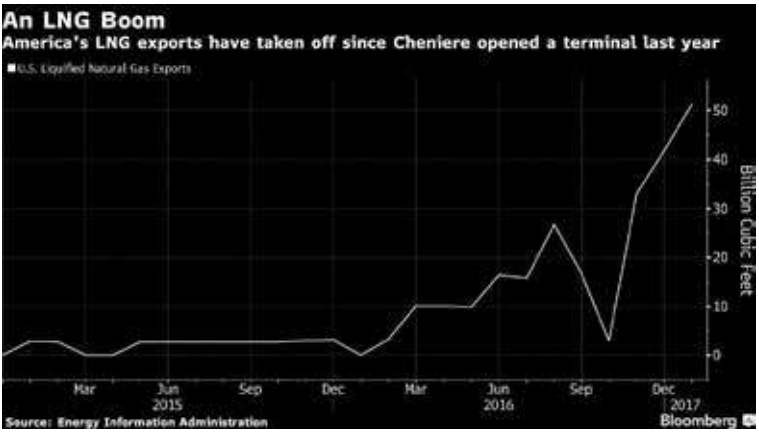
Note: Some approaches in this graphic are not consistent; however, the interpretation based on the LNG stated above is correct.



Graphic 15: EU existing and potential suppliers' natural gas costs (Source: Columbia University/ SIPA)

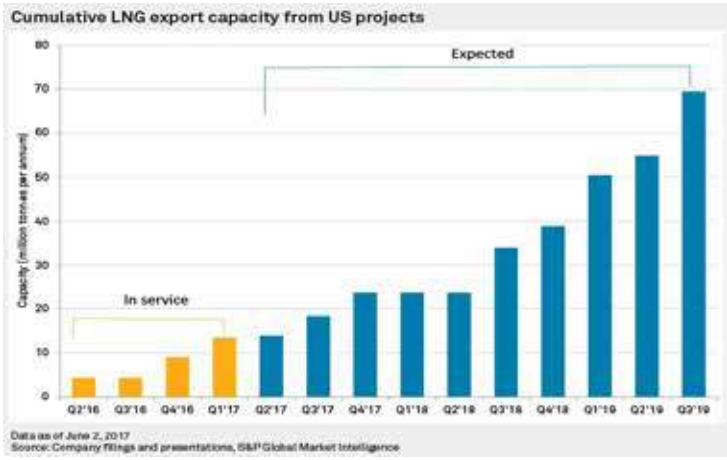
Graphic 16 shows how LNG exports of the US, which has potential of increase in source and production, after increasing its export facility capacity.

In other words, the US will increase its export capacity as it establishes new facilities in conjunction with oil prices and internal markets.



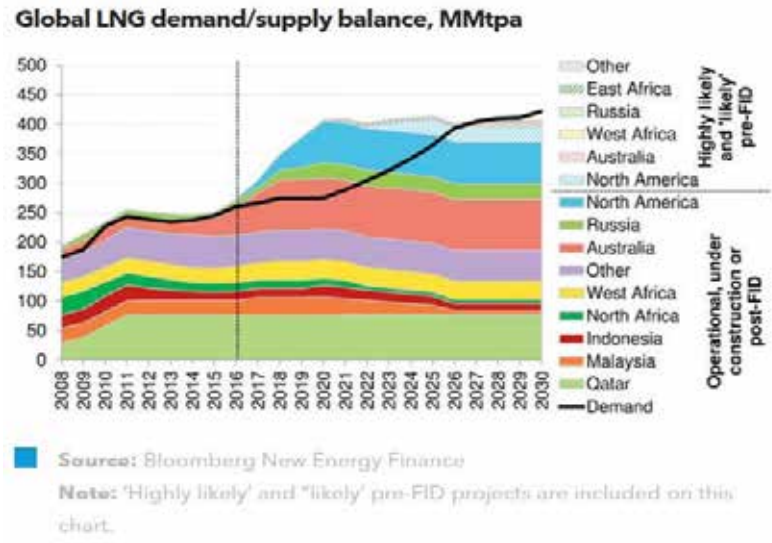
Graphic 16: Change in balances of US exports with a new LNG terminal (Source: Bloomberg)

It can be understood from the Graphic 17 that the US will have LNG export potential as Qatar has until the end of 2019 with planned and constructed LNG facilities. In other words, the US will fill the market gap easily due to a reduction in production after a potential embargo on Qatar or pressure over Qatar.



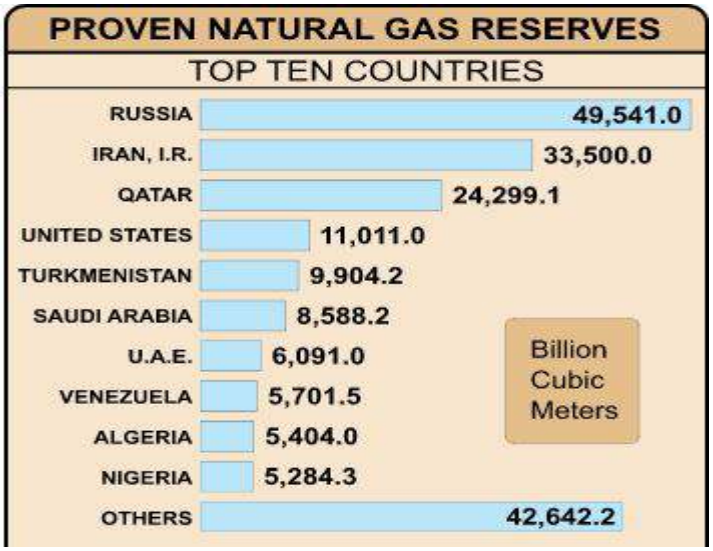
Graphic 17: US export potential with new LNG facilities (Source: S&P Global Market Intelligence)

Graphic 18 shows global LNG demand-supply balance. As it is seen, there is a competition in terms of supply between 2016 and 2025 since level of demand is lower than supply. North America (i.e. the US) which entered the LNG market recently attracts notice in this competition.



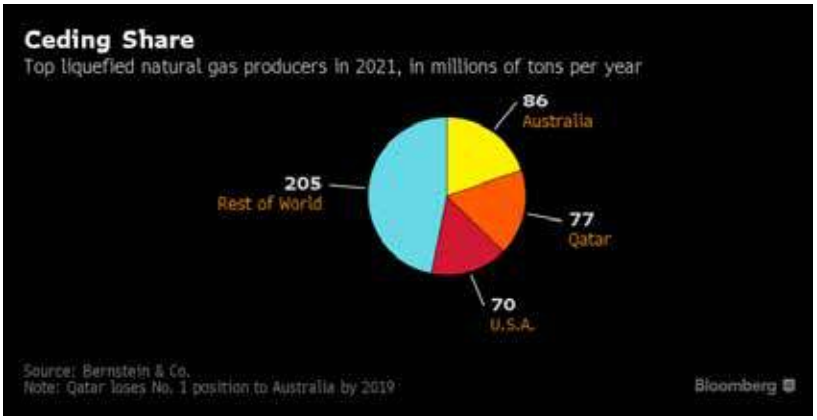
Graphic 18: Global LNG demand-supply balance (Source: Bloomberg)

Graphic 19 shows selected countries' natural gas reserves in billion m3 to compare proven source quantities. It can be understood from this graphic that Russia is the dominant country, Qatar is the third and the US is the fourth one.



Graphic 19: Natural gas reserves of selected countries (Source: 2016 Data of the OPEC http://www.theglobaleducationproject.org/earth/energy-supply.php))

It can be understood from the Graphic 20 that Australia rather than Qatar will be the leader in LNG market in 2021, by considering new LNG facilities planned. Nonetheless, the US will be the third country after Qatar.



Graphic 20: Top LNG producers' projected new capacities in 2021 (Source: Bloomberg)

After examining these graphics and approaches, the questions about the Qatar crisis and other energy related questions will be answered.

What is the Place and Importance of Qatar in the World Energy Balance?

As it can be understood from the graphics, Qatar is the 3rd important country in terms of natural gas reserves, the most important country in terms of LNG export, and the most advantageous county in terms of price competition by producing the cheapest LNG.

How Can the Changes in the World LNG Balance Be Summarized?

The trend toward LNG, LNG demand and LNG supply to meet this demand is increasing. LNG is becoming the most important agenda for natural gas policies and even for energy policies of many countries.

Who are the Competitor Countries for Qatar? And Who Will Be?

In this context, Qatar is the competitor for producers such as Australia, Malesia, Russia and Nigeria. Though, if Qatar can establish the related facilities, it will be the competitor for the US and Iran.

Has Qatar Any Superiority Over These Competitors?

Yes, it has! It is evident that it has superiority in terms of its existing client portfolio, agreements, production and transportation infrastructure, price competitive power by producing and transporting cheaply, and having enough resources.

Qatar is an LNG producer with extremely low fixed and variable costs making it a deal maker. Pressure from Egypt to Qatar for not using the Suez Canal makes Qatar to look for new routes to reach European markets especially to the UK. Since these new routes increases the transport cost, Qatar may have to re-direct its export to Asia rather than European markets.

Why is Qatar Competitor for the US LNG Market?

First of all, the US targets the major LNG markets such as the EU, Japan, and India in which Qatar is the dominant country. But, the US has not any chance to compete in terms of price with Qatar in these markets.

For Russia and Iran which have significant amount of resources, it is not so important to compete with Qatar due to internal consumption, markets reached via pipelines, and not realizing planned projects because of financial problems.

Egypt's export capacity is very limited and not high.

Australia's condition is similar to Egypt. Its advantage is lower than Qatar in terms of resource amount and costs. However, it targets Chinese and Indian markets in terms of logistical advantages. In this sense, it will be the one of the competitors for the US.

Nigeria will not compete with Qatar in terms of resources, costs and stability.

Thus, the most important competitor in LNG markets for Qatar is the US.

May The Process Go Beyond Introducing Embargo in LNG Export for Qatar?

It may be possible for a short time; however, it is needed that the US can do desired steps in the process that is worth introducing the embargo. It is seen that it can reach

this capacity until the end of 2019. Nonetheless, it may attempt to change Qatar's export policies by pressing over Qatar as an easier solution. At the end of the crisis process, the US underlined that it has most reliable vendor.

Thus, such a sanction may be considered for a short time to get share for new actors in excess supply markets. On the other hand, from a different perspective, US corporations' partnerships in natural gas producer firms may have an effect preventing the embargo.

What Will Be the Impact of the Embargo in LNG Export over the Markets?

As it can be seen in the graphics above, Japan, India, South Korea and the UK will be in difficult for a short time; however, as Graphic 16 shows that excess supply will fill the gaps in the markets. Moreover, rises in the prices will be realized, too.

How Will the Process Affect Oil Prices and OPEC's Decisions on Reduction?

OPEC's decisions on reduction are very limited. Particularly, production increase in North America will reduce this impact more. The influences of the reductions will be seen after 2020 more clearly.

Qatar has 1.9 million barrel/day oil production and 1.6 million barrel/day oil export.

- An increase in oil prices is predicted since an embargo decreases or ceases production.
- Moreover, it is predicted that prices will increase because the crisis creates a tension even when any embargo is not introduced. Though, North America can change the situation reverse.
- Overall, by regarding its magnitude in oil production comparing to Saudi Ara bia and the US, no significant impact like in LNG markets is expected.

Does the Crisis or a Potential LNG Export Embargo Work for Russia and Iran?

It does not work for Russia which has very limited power in LNG markets and for Iran which has no power in LNG markets to get any share in the short run. Nonetheless, a potential embargo will increase natural gas prices, which is better for both countries,

So, What is the Role of Energy in the Qatar Crisis?

Energy has no role in the Qatar Crisis as a major factor. It is just a mediator for the US to achieve some aims related to increase its activities in targeted markets. Accordingly, it is considered that energy is not a major but a minor reason in the crisis.

How to Summarize Qatar's Energy Balances?

Qatar produces 600,000-barrel oil and 1.3-million-barrel condensate daily. 300,000 barrels of this production is consumed in the internal market and the rest is exported.

It has approximately 180 billion m3 natural gas. Of this production, 106 billion m3 as LNG, 20 billion m3 via Dolphin Pipe Line (which is 48") in the UAE (17.7 billion m3) and in Omani (2.3 billion m3), and 6 billion m3 as GTL (gas to liquid) are transferred in related facilities. After transformation, they are exported to markets and the rest is consumed domestically.

When we look at energy consumption numbers, 17% of current consumption is oil, and the rest is natural gas. Electricity is generated from natural gas in a 99% ratio.

There are 14 LNG units in North Field which is the greatest natural gas field to transform natural gas to LNG. 7 units of them are operated by Qatargas (Qatar Petroleum + Exxon + Shell + Mitsui + Marubeni + Conocophilips), and 7 units of them are operated by RasGas (Qatar Petroleum + Exxon).

GTL facility in the country is operated by Qatar Petroleum and Shell.

Exxon, Occidental, Nippon, Maersk, Shell, Total, Sasol are foreign corporations operating in research, production and transportation in Qatar.

4. CONCLUSION

The US, which is attempting to form a struggle based on Sunni-Shia dispute without any active attack and spending any money after Egypt, Iraq and Libya, where the US could not fix the situation after pushing them into a chaos in spite of spending billions of dollars, has triggered a new crisis between Qatar and some other Arab countries.

The crisis has spread very quickly and the region is pushed in a new tension.

The Westerner mentality, which is very successful in terms of achieving their goals in the region with crisis and chaos and earning it with blood of Muslims, targeted Iran in principle as well as some other goals with the Qatar crisis.

Issues related to the crisis such as benefit analyses and goals are explained above.

In addition, it has been aimed to isolate Turkey by damaging its economy and diminishing the confidence in Sunni people. When we look into social media, sharing (made especially by Western groups and individuals) aim to create a perception that Turkey should cease its support to the Muslim Brotherhood and Qatar (otherwise Turkey will be declared as -so called- terrorist country), also it is not strong enough to solve this crisis.

From energy part, the principle goal is not energy in the crisis; however, it seems like that the US will benefit from the crisis by increasing its LNG export share.

Over all, Turkey, which stands by the oppressed, peace and humanity and does not want a new crisis in its region, has been taking action on whatever has to be done. The worst scenario is a potential Sunni-Shia war in the region of Middle East and Islamic World.

It should be noted that Turkey needs an agencies, which will develop and coordinate tackling of international blames, operate over global misperceptions and do great negotiations against any threat issue directed to its national security.

LIBYA: POLITICS & ENERGY

Hakan Başpınar

INTRODUCTION

The developments in Libya is in need to be closely watched to explain the oil problem especially the reasons for the developments in this geography for contemporary Africa and Middle East conjuncture. The revolution that resulted in the overthrow of the Muammar Gaddafi regime has filled the 6th anniversary on February 17, 2017, which emerged from Tunisia starting in December 2010 and in 2011, we saw consequences in Egypt and later in Libya. Despite the fact that six years have passed since the revolution in Libya, the causes of devolution aren't remedied and the aims of the revolution aren't realized. In order for the construction of the state and the security of the society to be achieved, it is necessary for all parties affected by this revolution to be reconciled.

In this study, the process of revolution will be examined by way of political and social elements of Libya. Also the energy sources of Libya will be mentioned and the cause of revolution will be stated. In addition, this study will be dwell on relations between Turkey and Libya, and between Libya and External Powers.

REVOLUTION PROCESS IN LIBYA

If we briefly look at the emergence of the revolution in Libya, the first pre-revolutionary turmoil in Libya emerged in January 2011. The reason for this confusion is not political but economic concerns in the first instance. Later in February, when hundreds of Libyans were gathered in front of the police station in Benghazi to demonstrate, it was made politicized. Gaddafi and the security forces reacted very harsh to the demonstration, and the turned into an anti-regime actions of Libyan people. The situation made Gaddafi use enormous power to suppress the actions and the demonstrations had become a civil war.

High inflation rates caused by increasing food and housing prices, coupled with the unbalanced distribution of income, led to a deterioration of living conditions for many Libyan families and unskilled foreign laborers. Libyans were particularly frustrated over the decrease in living standards, while the country had generated billions of dollars from hydrocarbon exports, many of which had been spent on Gadhafi's foreign policy adventures of fighting imperialism or the unification of Africa. Ordinary citizens argued that a country rich in energy resources, with a relatively small population, should be able to offer high living standards to its population, in the same manner as in the rich

Gulf States.[1] The beginning of the revolution was that the Libyan people began to feel uncomfortable with the administration. They began to compare their governments with the Gulf countries which has also petrol resources.

Conflict against Gaddafi was not a real power struggle between tribes. Mobilization of the revolutionary militias largely occurred on the basis of towns and cities rather than tribes/families even though the distinction between local and tribal ties was very complex in many cases especially in the smaller towns. Due to their skill and experience as producers of order and conflict mediators based on customary tribal law, tribal politicians have come to play a dominant role in the local transitional councils and the city-based military councils.[2]

The primacy of protecting civilian lives was propagated throughout the Libyan conflict, this interpretation ignores NATO's pursuit of a political objective, which, at times, undermined its mandate to protect civilians. NATO used more than 200 cruise missiles and 20,000 bombs in its operation in Libya, including non-military targets, to support the groups that would ascertain their political and commercial interests in the oil rich nation. Human Rights Watch stated that NATO's actions directly resulted in more than 70 confirmed civilian deaths, including women and children.

LIBYA'S SOCIAL AND POLITICAL STRUCTURE

The social structure of Libya is one of the most important reasons why Libya is so influential in shaping the developments in this geography, which brought Muammer Gaddafi to power and ended his rule. Tribes are the main components of social structure in Libya and the majority of the population belongs to those tribes. Muammer Gaddafi regime was built on alliances with tribes rather than political alliances. This situation has been a milestone both during the Gaddafi regime and in the post-revolutionary politics. In this direction, some tribal leaders and militia forces, who are close to the regions with rich oil deposits in Libya, began to ask for after the 2011 revolution.

Trilemma is dominant in Libya's political structure. The existing political situation in Libya is described by three oppositional factors: Islam, democracy, and shadow state. These factors, composing a trilemma, could seem to be incompatible with one another, and the renouncing of, at least, one of them seems inescapable. In its simplest terms, the events in Libya consist of conflicts between Islam, democracy and the shadow state. The concept of shadow state has been used because foreign powers in Libyan territory produced a conflict in domination of the country and foreign powers had to build autonomous authorities in Libya by making use of the social structure in this region.

Although tribes undoubtedly have strong relevance in today's Libya, this must not be over-estimated. Libya is divided into 140 main tribes, but only 30-40 of them are influential, playing an important socio-economic and political role. In particular, this happens

1 Mohammed El-Katiri, "State-Building Challenges in a Post-Revolution Libya", Strategic Studies Institute, October, 2012, s.8.

2 Wolfram Lacher, "Families, Tribes and Cities in the Libyan Revolution", Middle East Policy Council, http://www.mepc.org/families-tribes-and-cities-libyan-revolution (accessed: 10.05.2017)

in the greater Tripoli area and to some extent also in Benghazi, where the bulk of the Libyan population living under the influence of the tribes is rather limited. Nevertheless they are still an important factor outside the large cities mentioned above, and above all in the rather remote areas of the east, southern Cyrenaica, southern Tripolitania and the Fezzan. More than 90% of Libyans consider themselves to be Arab or an ethnic mix of Arab and Berber. Other ethnicities include the previously nomadic Tuareg and Tebu tribes in the south and the Berbers (Amazighs).[3]

The notion of qabila (tribe) in Libya could be explained as a various social organization form. Because in Libya, people respect their tribes. That's why their tribes determine everything about people who is incidental to them such as behavior, political side, vision of world and opinion. Tribal culture includes moral judgments, honors, shames, and concrete procedures in Libya's social structure. The tribes form their own rules and laws. These laws and rules might be different between the tribes.

Gadhafi had integrated a large part of his own tribe, the Ghaddafa, as well as the Warfalla tribe (Libya's largest tribe with an estimated two million people) and the Maghara (the tribe Gadhafi married into) into top positions within the government and the military. Gadhafi had to leverage the Maghara and Warfalla tribes during his rule, as historically, the Warfalla tribe not only outweighed the Ghaddafa tribe in prominence and resources, but also maintained power relations in the new domination; the Warfalla historically employed the Ghaddafa to look over resources and cattle.[4]

Tribal institutions are playing an important role in providing order during the protracted political vacuum. Election, which made in July 2012, gave tribes the possibility to be represented in the new democratic structure. Because of that most of the elected independents represent the interests of individual cities, tribes or families.

At the moment, Libyan Trilemma have no solution as there seems to be no solution for the Libyan Trilemma. Libya is probably doomed to remain a "hybrid country" for some years to come. Probably, the strongest factor among the three mentioned above, is the one of being a relevant rentier state. In regard to the other two elements, Islam and democracy, the result of their confrontation will moderately depend on the decisions assumed by tribal society.[5]

---

3 S. Tarkowski Tempelhof, M. Omar, "Stakeholders of Libya's February 17 Revolution", USAIP(United State Institute of Peace), Special Report 300, January 2012, s.8-9.

4 Larbi Sadiki, "Wither Arab 'Republicanism?' The Rise of Family Rule and the 'End of Democratization' in Egypt, Libya, and Yemen," Mediterranean Politics 15, no. 1, 2010, s.99–107.

5 Arturo Varvelli, "The Role of Tribal Dynamics in the Libyan Future", ISPI(International Society for Performance Improvement), Analysis No.172, May,2013, s.10.

http://www.ispionline.it/sites/default/files/pubblicazioni/analysis_172_2013.pdf (accessed: 22.05.2017)

ENERGY RESOURCES

Libya's has coasts to the Mediterranean such as its neighbors Tunisia, Algeria, Niger, Chad, Egypt and Sudan have. Libya has the largest surface area after Sudan, Algeria and the Congo in Africa. Libya has a population of over 6 million. Libya has petroleum which is valuable because of its high quality and low cost of extraction and 40% of the reserves large natural gas reserves in Africa.

Other than Petrol resource, American and European multinational corporations' intention to confiscate water source. Nubian underground water layer formed colossal fossil water reserve which is underlying Libya, Egypt, Sudan and Chad. Possibilities offered by this reserve, millions of cubic meters of water extracted from 1,300 wells along the length of 1600 km from the desert to coastal cities and by being transported by built aqueducts and making the desert land productive. It was put forward by the Libyan State.

According to a Libyan oil source and local official, .Libya's 300,000 barrels per day Sharara oilfield and 90,000 bpd El Feel oilfield have restarted after the end of protests that had blocked pipelines there.

In December 2014 and January 2016, militia forces attacked the country's largest oil export port, Sidra. These attacks have seriously affected the production and export of oil in the country. The people of Libya were very disturbed that the production and administration of petroleum were in the hands of the militia forces.

When we arrived in March 2017, General Khalifa Haftar, head of the Libyan National Army, took back Sidra and Ras Lanuf oil ports, which have Libya's 60% oil export capacity, from the Benghazi Defense Brigade in Benghazi.

Libyan crude production stood at 491,000 bpd on Thursday, but the OPEC member was targeting 800,000 bpd soon and 1 million to 1.1 million bpd by August, the chairman of state oil firm NOC (National Oil Corporation) said on the sidelines of an industry event in Paris.[6]

In general, the economy depends on oil and natural gas as Libya has proven 42 billion barrels of crude oil and 1505 trillion cubic meters of natural gas reserves. Before the crisis that began after the overthrow of Muammar Gaddafi in the country; oil production, which was 1 million 700 thousand barrels per day, has declined to 700 thousand after the crisis.

Also Libya has the fourth largest natural gas reserve in Africa. With an annual output of close to 590 billion cubic meters, it accounts for 0,8% of world gas consumption. After the establishment of the Greenstream Pipeline, the prosperity of Libya's natural gas has gained more importance for European states. French Total, British BP, Lasmo, Exxon Mobil, Italian ENI group, American Occidental, Russian Rosneft, Spanish Repsol, Austrian OMV and Swedish Lundin oil companies have won important contracts in Libya.

Libya has Africa's largest oil reserves country. Oil is the lifeblood of the Libyan econ-

6 Julia Simon, "Oil prices fall more than 1 pct after Libyan oil fields restart", 27 April 2017, http://www.cnbc.com/2017/04/27/reuters-america-update-7-oil-prices-fall-more-than-1-pct-after-libyan-oilfields-restart.html (accessed: 25.05.2017)

omy and 80% of the country's income comes from oil exports. Before the 2011 revolution, Libya was producing about 1.6 million barrels of oil a day. The environment of conflict emerging with the revolution almost stopped all of the country's exports. Because the country's economy depends on oil exports, economic deterioration with the revolution distorted the balance of domestic payments and caused deficit of employment.

For the first time since December 2014, Libyan crude oil production has topped 760,000 barrels per day (bpd). The three-year high has largely been driven by the re-opening of the Murzuq Basin's El Sharara and Elephant fields, which contribute an estimated 280,000 bpd of output. Following this latest uptick in production, many investors are left pondering whether Libya's crude oil sector is about to settle down into a more stable and predictable production rhythm, or whether this latest development merely represents yet another false start for the troubled North African state.[7]

RELATIONS WITH TURKEY

Turkey has deep rooted relations with the Libyan people. Due to its historical and cultural bonds, Turkey attaches utmost importance to the security and welfare of the Libyan people. Following the Revolution of 17 February 2011, Turkey recognized the National Transitional Council as the "sole representative of Libyan people". Turkey has been the first country to appoint an Ambassador to Tripoli on 2 September 2011, after the full control of Tripoli by the National Transitional Council.

When we look at the revolutionary process, even Turkey-Libyan relations contained largely economic relations at the time of the overthrown leader Muhammad Gaddafi, who ruled Libya between 1969 and 2011, Turkey have attitude friendly behavior to Libya during revolution and after revolution.[8]

In line with the urgent priorities of Libya, Turkey has contributed to institution building efforts in Libya, particularly in the fields of security and economic recovery. Nevertheless, in 2014, assistance programs led by Turkey have been suspended, due to deteriorating security situation in the country.

Due to the same reasons, Turkish Consulate General in Benghazi has temporarily been closed on 14 June 2014. Turkish Embassy in Tripoli is also not operational since 25 July 2014. On the other hand, Turkish Consulate in Misrata continues its operations.

Turkey has actively supported the Libyan political dialogue process facilitated by the United Nations throughout 2015. Turkey has engaged with all sides in Libya in order to encourage them to join the political process and come out with a mutually acceptable agreement. Turkey has closely followed meetings of the political dialogue participants and hosted various meetings of Libyan stakeholders.

7 James Appleyard, "Libyan crude production rebounds, but for how long?", 4 May 2017, https://www.linkedin.com/pulse/libyan-crude-production-rebounds-how-long-james-appleyard (accessed: 17.05.2017)

8 Emrah Kekilli, "Türkiye-Libya İlişkileri Kriz Alanları ve İş Birliği İmkanları", SETA Analysis, 2017, No: 191, s:8

Turkey has welcomed the signing of the Libyan Political Agreement on 17 December 2015, which offers a clear framework for long-lasting peace and stability in Libya. Mr. Cavusoglu, Minister of Foreign Affairs of Turkey, took part at the signing ceremony held in Skhirat, Morocco. Turkey supports the Government of National Accord in its endeavors to effectively implement the Libyan Political Agreement. Maintaining close cooperation with the new Libyan authorities, Turkey will resume assistance programs in coordination with the Government of National Accord, once the security situation on the ground allows.

The United Nations-backed, internationally recognized Government of National Accord (GNA) struggled in 2016 to assert itself in the capital Tripoli, as two authorities—one also based in Tripoli and another in eastern Libya—continued to compete for legitimacy and control over resources and infrastructure.[9]

Forces aligned with all governments and dozens of militias continued to clash, exacerbating a humanitarian crisis with close to half-a-million internally displaced people. The civilian population struggled to gain access to basic services such as healthcare, fuel, and electricity.

Militias and armed forces affiliated with the two governments engaged in arbitrary detentions, torture, unlawful killings, indiscriminate attacks, abductions, and forcible disappearances. Criminal gangs and militias abducted politicians, journalists, and civilians—including children—for political and monetary gain. The domestic criminal justice system remained dysfunctional, offering no prospects for accountability, while the International Criminal Court (ICC), despite having jurisdiction over Libya provided by the UN Security Council, failed to open any new investigation into ongoing crimes.

The United States, United Kingdom, France, and the United Arab Emirates reportedly expanded their military activities in Libya to support forces in fighting extremists in Sirte and Benghazi. These countries were using the mask "fighting extremism". In fact they were manipulating relations between people of Libyan and exploiting them.

According to Human Right Watch: "The Islamic State (also known as ISIS) lost control over large parts of its self-proclaimed capital in Sirte, where it had been based since June 2015, and remained embroiled in fighting with Libyan and foreign forces. ISIS groups summarily executed people for alleged witchcraft and "treason" and imposed a severe and restrictive interpretation of Sharia law in areas under their control."

Tens of thousands of migrants, asylum seekers, and refugees from Africa and the Middle East transited through Libya on their way to Europe, with at least 4,518 drowning or going missing while crossing the Mediterranean in unsafe vessels. While in Libya, armed groups and guards at migrant detention facilities subjected many to forced labor, torture, sexual abuse, and extortion.

According to news of Al Arabiya; Libyan army spokesman Colonel Ahmed al-Mesmari said that Qatar, Sudan and Turkey as "the triad of terrorism" in Libya". He strengthen his claim with this sentence: The evidence confirms that a number of Qatari aircraft are regularly landing in Libya in 2017 to support terrorist groups."

9 "Libya Events of 2016", Human Right Watch, https://www.hrw.org/world-report/2017/country-chapters/libya (accessed: 24.05.2017)

GLOBAL ACTORS

Since 2011, there has been political upheavals and violent struggles in Libya. While this struggle is costing Libya more than it could have imagined, the western powers in contrast appear willing to witness the Libyan tragedy horribly unfold. The NATO intervention was a realist move that unleashed forces and dynamics that have resulted in an ongoing political and military struggle and the destabilization of the state.

Colonel Gaddafi had a well-documented tense relationship with the Western powers and their multinational companies. Once Gaddafi was ousted, Western financial interests would be in a prime position to benefit from a liberalized economic system. Indeed, the National Transitional Council said that it intends to reward countries that supported its fight. British Defense Secretary Philip Hammond urged companies to "pack their suitcases" and head to Libya, prompting some to posit that the "starting pistol" for Libya's resources has been fired. Moreover, Hammond stated that while much of Libya lay in ruins, "great care had been taken" to avoid destroying critical infrastructure necessary for commercial operations. These financial interests were not merely reacting to new business opportunities; rather, Libya's "coming bonanza" was an ongoing topic amongst transnational economic networks well before the regime collapsed. Economist Joseph Stiglitz implicitly concurs with a Marxist interpretation of the use of force to open previously closed markets. He states that the US has adopted "an increasingly hard-powered economic agenda," noting "America's international political economy was driven by a whole variety of special interests which saw the opportunity to force other countries to open their markets to its goods on its terms". As such, the Libyan conflict was a result of capitalist interests seeking to upend the Libyan political system to benefit particular upper-class interests.

Nearly six years after the fall of the Gaddafi regime, questions endure regarding the reasons for NATO's decision to intervene. Empirical evidence suggests a political objective superseded humanitarian considerations. A liberal interpretation arguing for the primacy of human rights cannot account for NATO's conduct during the conflict. But on the ground assessing the real intentions of western powers, provide intriguing evidences for the primacy of political motivations. Nevertheless, normatively, humanitarian intervention was not intended to be a shortcut to regime change. Taylor B. Seybolt makes an important point about that: "humanitarian intervention might be less likely in future situations where civilians truly need help if the claim of humanitarian motives is doubted because of past misuse."

The United States, European Union, and regional states all played significant roles in the armed conflicts occurring in Libya. The US, France, and United Kingdom reportedly participated in military activities in support of Libyan forces against militant groups, most notably ISIS in Sirte and Benghazi.

Efforts to reach a political settlement between warring factions, led by the UN envoy to Libya Martin Kobler, and backed by members of the international community most notably the US, UK, France, and Italy, failed to achieve the desired results as parties remained engaged in hostilities, competing for legitimacy.

On March 8, the UN Panel of Experts on Libya, established pursuant to UN Security

Council resolution 1973 (2011), issued its final report which said that several countries, individuals, and companies were responsible for violations of the arms embargo against Libya. According to the report, the UAE, Egypt, Ukraine and Sudan have all violated the arms embargo against Libya since 2011, by transferring weapons, ammunitions, aircraft or armored vehicles to the conflict parties.[10]

Also in March, a leaked document revealed that British Special Forces had been actively fighting extremist groups in Libya since January. In July, France announced that three of its soldiers were killed in Libya after a helicopter crashed during an intelligence-gathering operation. In August, the US expanded its air campaign in Libya, at the request of the GNA, to include targets in the ISIS stronghold of Sirte.

The Office of the High Commissioner for Human Rights (OHCHR) released a report in February documenting widespread violations and abuses committed in Libya since 2014 that included unlawful killings; indiscriminate attacks; torture and ill treatment; arbitrary detention; abductions and disappearances; and violations against women, journalists, human rights defenders, migrants, and children.

Despite a recommendation by the High Commissioner that the Human Rights Council consider establishing an independent expert mandate on Libya to report on the human rights situation and progress towards accountability, the council's resolution only requested a further report from the high commissioner in March 2017. In a September update, the high commissioner's office reported to the council that the situation has not improved and that impunity prevails, and reiterated the recommendation that the council create an independent expert mandate.

The UN Security Council extended for another 12 months in March an arms embargo on Libya. In June, the council unanimously authorized the inspection of vessels off Libyan high seas in an effort to crackdown on illicit weapons smuggling. The council also passed a resolution in July that authorized moving Libya's category 2 chemical weapons out of the country and destroying them. In October, the council renewed its authorization for the interdiction of vessels used for smuggling migrants on the high seas off the coast of Libya.

When we look at Human Right Watch report, The Rule of Law and Human Rights division at UNSMIL (UN Support Mission in Libya), which operates from Tunis and visits Libya only rarely due to security concerns, scaled down its public reporting on human rights violations. However, in March, it started producing a monthly bulletin on civilian casualties in Libya.

In June, the EU extended its anti-smuggling naval operation in the central Mediterranean, Operation Sophia, to include training for the Libyan Coast Guard and Navy. In July, NATO committed to supporting Operation Sophia by providing intelligence, surveillance, and reconnaissance, as well as capacity-building for the Libyan coastguard and navy.

As a result, Libya is a chess board today and players are not strange to us. We had seen them at First World War and later on the Second World War. However, the war notion

10 "Libya Events of 2016", Human Right Watch, https://www.hrw.org/world-report/2017/country-chapters/libya (accessed: 24.05.2017)

has a bit changed today, key players are using some groups in Libya to fight for their own way.

The Tripoli government, which was recognized by the UN in the region and led by Prime Minister Fayez Al Sarraj, is supported by Qatar and Turkey. The Libyan Political Agreement, signed in Morocco in December 2015 under the auspices of Russia, Egypt, France and the United Arab Emirates, provided a temporary peaceful atmosphere in Libya. But this peaceful atmosphere wasn't long. Haftar strengthened and rejected Fayez Al Sarraj's administration. Russia wants to be indispensable in the region by trying to establish a negotiation environment between Sarraj and Haftar.

In February 2017, a meeting was held in London between Libyan National Oil Company Director Mustafa Sanalla and Russia's Rosneft Director Igor Sechin. In the context of this meeting, a co-operation agreement was signed under which new investments in oil production and new capacity-building measures after the revolution. This deal is the first foreign investment agreement of Libya since 2011. At the meeting, Sanalla stated that until the end of this year, oil production could reach an estimated 1.25 million barrels per day. Russia has increased its effectiveness in Libya with this cooperation agreement. Russia wants to play an active role in the region by acting as a mediator in ensuring political stability in the region.

In May 2017, Fayez Al Sarraj and Khalifa Haftar came together in Abu Dhabi under the mediation of Egypt and the United Arab Emirates. Opinions were presented for a permanent agreement in Libya and for the end of the conflicts. Decisions were made on the formation of a three-person presidency council, the unification of the army's command, the introduction of a ban on some Islamic militants, and the presidential election will made within a few months. Despite these decisions, the chaos environment still exists in the country and the environment of insecurity among the groups continues.

Khalifa Haftar who is head of Libyan National Army, is supported especially by Russia and the changing conjuncture the United Kingdom, Egypt and the USA. By playing the role of referee in Libya, Russia hopes for political and financial gains in the long run in the form of lucrative contracts and loyalty of any new Libyan government. By partnering with Haftar, Russia accomplishes a number of its goals, from expanding its influence in the Mediterranean and engaging Egypt more intensively, to acquiring another bargaining chip in its relations with Western counterparts.

Russia would arguably prefer a strong military figure who can channel its interests, such as Haftar, think an important role in any future Libyan government. For that to take place; however, it needs to bring all sides to the meeting, and obtain what Western powers have thus far failed to achieve: pressuring competing Libyan factions into a compromise that produces a legitimate, national government recognized by all sides.

Sergey Markov who director of Russian Institute of Political Studies talked to Aljazeera News Agency: "Libya is a camp for Russia's confrontation against NATO. Toppling the former regime has been a foolish move that has sent into motion the collapse of all the states in the North African continent. Russia has considered this an act of aggression." We see in Libya, secret deputation war. Libya has become a struggle area for international great powers.

CONCLUSION

If we analyze the process of existed policy in Libya, we notice that the main reason of the intervention is the natural resources of the country like oil and natural gas. Old leader Kaddafi was dominant power over lots of natural reserves, which had disturbed western countries. Thus, the western countries had supported some militias in the country on the way to the revolution against Kaddafi.

Those reasons mentioned above, location of the country in the continent and activity of native tribes shows us why Libya went into such chaos. At one hand, there is the uncompromising attitude of the tribes and powerful western actors on the other hand.

Tribes have been quite influential in reshaping of Libya's current history. Both pre-revolutionary and post-revolutionary tribes in Libya were influential in Libyan politics, which, in turn, made Libya vulnerable to the separatist activities of foreign powers. Western powers have pursued a policy of influencing and reshaping process in Libya more actively. Western countries want to be active in Libya, which has rich energy resources that smelled of oil and natural gas to the Westerners.

As a result, all factors are hindering Libya to keep out of chaos and reach the stability for 6 years. Western powers know very well how to confuse countries, which are wealthy of vast energy sources. We have seen many examples of this situation in the countries that have oil resources.

REFERENCES

- Arturo Varvelli, "The Role of Tribal Dynamics in the Libyan Future", ISPI(International Society for Performance Improvement), Analysis No.172, May,2013.http://www.ispionline.it/sites/default/files/pubblicazioni/analysis_172_2013.pdf (accessed: 22.05.2017)
- Emrah Kekilli, "Türkiye-Libya İlişkileri Kriz Alanları ve İş Birliği İmkanları", SETA Analysis, No: 191, 2017
- James Appleyard, "Libyan crude production rebounds, but for how long?", 4 May 2017, https://www.linkedin.com/pulse/libyan-crude-production-rebounds-how-long-james-appleyard (accessed: 17.05.2017)
- Julia Simon, "Oil prices fall more than 1 pct after Libyan oil fields restart", 27 April 2017, http://www.cnbc.com/2017/04/27/reuters-america-update-7-oil-prices-fall-more-than-1-pct-after-libyan-oilfields-restart.html (accessed: 25.05.2017)
- Larbi Sadiki, "Wither Arab 'Republicanism?' The Rise of Family Rule and the 'End of Democratization' in Egypt, Libya, and Yemen," Mediterranean Politics 15, no. 1, 2010.
- "Libya Events of 2016", Human Right Watch, https://www.hrw.org/world-report/2017/country-chapters/libya (accessed: 24.05.2017)
- Mohammed El-Katiri, "State-Building Challenges in a Post-Revolution Libya", Strategic Studies Institute, October, 2012.
- S. Tarkowski Tempelhof, M. Omar, "Stakeholders of Libya's February 17 Revolution", USAIP (United State Institute of Peace), Special Report 300, January 2012

• Wolfram Lacher, "Families, Tribes and Cities in the Libyan Revolution", Middle East Policy Council, http://www.mepc.org/families-tribes-and-cities-libyan-revolution (accessed: 10.05.2017)

WATER CONFLICTS IN NORTHERN SYRIA

Sinan Uzundumlu
Oğuzhan Akyener

INTRODUCTION

Water although usually is not considered as the most important fluid in the public view, its importance and staminality can easily be understood during the privation. In today's world, while some regions have plenty of water, in the other side, some parts are being lack of it.

As mentioned above, the importance of water can be understood, while losing it. Then water becomes one of the most strategic items for countries, when there is a risk of drought.

Turkey is one of the luckiest countries having plenty of fresh water resources. And some of its resources are huge rives flowing to the neighbor countries.

Euphrates is one of them. It has more than 2800 km's length and nearly 1 tones per second flow rate. It flows from Turkey to Northern Syria. To control the river, Turkey has Ataturk Dam in its borders. And in Syria there are Tishrin and Euphrates Dams in the entrance of the lake. There are many conflicts experienced between Syria and Turkey related with the utilization and flow rate homogeneity of the river.

Currently, in the international public view, a new unfair perceptional operation is tried to be activated against Turkey, which claims that:

- Turkey has cut the Euphrates and all the Northern innocent Syrians are left in a situation of being lack of water.
- They are snatching to death due not to be able to reach drinking water.
- Turkey is delinquent according to the 64/292 numbered decision of UN Res olution Agreement

However, these accusations are directed and organized/financed by some dirty enemies of the humanity and the peace. And they are all unfair perceptions.

In this study, the situation of the current due dynamics in the region will be described and by evaluating the due UN resolution, accusations among the Turkey will be rebutted.

EUPHARATES

The Euphrates which originates from Turkey and extends from Syria to Iraq is defined as one of the most important fresh water resources for both Turkey and Syria. In the Turkish side, Ataturk Dam and Northern Syria side Tishrin and Euphrates Dams are used for the water accumulation, distribution, purification, irrigation and electricity generation. Both dams are on the same branch of Euphrates.

Map1: 2 Lakes and Dams on Euphrates (Source: Google maps)

Both dams and the dam lakes can be observed in the map above.

Ataturk Dam in Turkey, Tishrin and Euphrates Dams in North Syria are used as water and electricity source in the region. But the due to the ongoing civil war in Syria, the Tishrin and Euphrates dams have been seized by terrorist organizations and are not working efficiently.

However, as easily can be understood from the map above, although there occurs an unexpected regime/flow rate change in the Euphrates due to Turkey, this will not result in being lack of drinking water in the regional society. Hence, there is a huge fresh lake existing in the region. If there is a cut in the utilization / drinking water in the Northern Syria, this question has to be diverted to the due terrorist organizations PYD&YPG&P-KK acting and US & Russia governments, which are supporting those terrorists in the region.

UTILIZATION AGREEMENT

Naturally, as can be expected, there is an existing water utilization agreement with Syrian and Turkish Governments. However, at present, there is no presence of the Syrian Government in the region for Turkey to get interlocutor.

On the contrary, the dam is being managed by the terrorist organization YPG.

Although there is a terrorist control on due water resources, Turkey did not completely cut the water for the innocents not to be faced with more persecution in addition to existing

PYD/ YPG ACCUSATIONS

By filling the management gap in the region, these terrorist organizations that occupy the land in Syria can't produce electricity because of the irregular flow rate due to irregularities occurred by some technical problems in Turkish side.

Due to this irregular regime, some of the terrorist activities they engage cannot easily be operated and hobbled. At the same time, due to this irregularity, the public living in the region is also experiencing difficulties in providing electricity and experiencing unrests. This situation also hurts the dominance of the Kurds, where they are ethnically minority in the region.

In addition, they are trying to create the perception in the international public opinion that Turkey doesn't serve water to the region and the people living in the region are dehydrated because of the lack of drinking water.

Many Western think-tanks that feeding hostility Turks and Islam, are also supporting this perceptional operation without looking at any maps or evaluating any objective sources of the region and blaming Turkey for violating the UN's relevant laws.

DUE UN RESOLUTIONS

Turkey is being accused because of the 64/292 numbered decision of UN Resolution Agreement. However, this decision merely states that drinking water is a vital human right, and the countries which have drinking water troubles should be supported in this respect. Through Resolution 64/292, the United Nations General Assembly explicitly recognized the human right to water and sanitation and acknowledged that clean drinking water and sanitation are essential to the realization of all human rights. The Resolution calls upon States and international organizations to provide financial resources help capacity-building and technology transfer to help countries, in particular developing countries, to provide safe, clean, accessible and affordable drinking water and sanitation for all.

So, while evaluating this situation according to the due UN Resolution:

As can be understood above, the accusations are completely unfair and inconsistent. Because;

- There is not a government managing the region, the region is in the control of terrorist organizations.
- Even if there is a state of affairs in the region, there is no question that people suffering from even drinking water, daily use water. Because there is Tishrin Dam in the same branch with Euphrates River in the region. And the capacity of the relevant dam is sufficient for the people living there. The water shortage is likely to be experienced only due to problems with the internal distribution and transportation systems. Presuming responsible Turkey for internal distribution and transportation of water would be a ridiculous approach, surely.
- The PYD / YPG terror organizations those blaming Turkey are not only

presenting these claims, but they also cause water problems to the people of the region. The water going from the Euphrates Dam to Aleppo, which is the continuation of the Tishrin dam, was cut by these terrorist organizations. And as a result, the people of Aleppo are suffering from both water shortages and electricity shortages in the region.

- The due UN's decision has no relevance to the issue.
- Changes in water flow depend on various factors such as time, technical conditions, amount of rainfall in the region, occupancy rate of Atatürk Dam, and it does not prevent the maintenance of vital activities in the region.

WHY BLAMING TURKEY?

Turkey, which is the sole dominant State in the region with its large global targets, has been only hope of the oppressed people living in the Middle East as in the past, and has conquering the hearts of the people in the region after the operations to the terror organizations.

The increasing influence and activity of Turkey with its global targets, which will not allow neither any terrorist organization in the region nor any oppression of the game builders that terrorists rely on, is the main reason for all these unjust operations.The new Turkey, which has become stronger and independent with its globally huge aims, is continuing to attract the hate of the Western tyrants and subcontractors in the region.

But, as it was before, Turkey with its justice will be victorious in spite of all black plans in the region.

RESULTS

In recent years, Turkey's more influential policies in the Middle East, and its operations in northern Iraq and northern Syria to DAES and YPG / PYD terror organizations, have been extremely disturbing the Western imperialists. As a result of this, many allegations against Turkey have been put forward and different perception operations have been made and implemented in order to impose this on the international public opinion.

These perceptional operations have sometimes been successful and sometimes frustrated. The perception that has recently been woken up by social media and other media, which is trying to resonate in the international public opinion, is that Turkey has left the people living in northern Syria without water.

However, this is not realistic.

In this paper, the dynamics in the Northern Syria and the situation of the utilization of the water resources of Euphrates River has shortly tried to be described.

As can be understood, in this water crisis in the Northern Syria, the real side to put the blame on is the terrorists and their Western supporters in the region. Not Turkey!

Hope for the international public views to be honest and be able to think more clearly and scientific.

TURKEY'S LNG FUTURE & EXTERNAL THREATS TO DERAIL ANKARA'S STRATEGY?

Cyril Widdershoven

INTRODUCTION

Turkey's ongoing national and international gas adventures are until now a success story. The dream to become an energy hub has been positively supported by ongoing large-scale LNG import facility projects, gas storage expansion and the already well-known Turkish gas-pipelines, which are partly built to link up to the European markets. Russia's renewed interest to use Turkey as one of its main transit routes to the European Union has been the main basis for the success until now. Central Asia, the Caspian and Iran, are the main other pipeline gas exporters, which have supported Turkey's energy hub strategy as well. President Recep Tayyip Erdogan has been pushing for these intraregional energy links since the start of his political reign. Bringing in a combined pipeline and LNG gas supply to Turkey, partly to supply the growing local gas demand, also has been material to the increased interest of the European Union in the country's gas strategies.

In stark contrast to Western European countries, Turkey (Erdogan) has, from the start, understood that diversification of supply is necessary not only to increase overall competitiveness in the market but also to be sure that security of energy supply is guaranteed. From the start, Turkey has been mainly looking to the former Soviet Union region, as this still is the main onshore gas supply route.

Other gas supplies have been out of reach until recently, due to the geographical position of Turkey or regional instability. Iran, as one of the world's largest gas producers, holding the second largest gas reserves in the world, always has been on the mind of Turkey as an additional supply route. A main gas pipeline system has already been put in place, supplying Iranian gas to the Turkish markets, but a potential expansion of volumes has been until now constrained by financial and political issues.

CURRENT POSITION

The last years, Turkey's gas consumption has risen fast and sharp seasonal demand swings and limited storage mean supply is tight over winter. The latter has led to the deployment of FSRU's as a solution to Turkey's problems. With demand growing from 27bcm in 2005 to 48bcm in 2016. About 70 per cent of this demand growth has come from increased gas use in power and industry, of which 70% has come from Turkey's

robust economic growth and a 30% hike in winter demand for heating demand in the residential and commercial sector. The expansion of the natural gas grid to more consumers also has led to a larger penetration of gas as energy source the last years.

The difference in demand between peak and through month has grown from 1bcm 10 years ago to almost 3.5bcm last year (2016). Seasonal supply, in turn, is limited by import capacity. Flows through congested pipelines from Russia, Iran and Azerbaijan are already operating at, or close to, maximum capacity during peak winter months.

Increased flexibility needs, constrained by limited storage capacity, new supply options such as LNG are needed. Most analysts are very optimistic about the impact of LNG in the Turkish markets, due to the global oversupply of LNG which is expected through 2024. The latter has and will have a positive economic and commercial impact on Turkey gas prices, as Ankara and all involved partners will be able to renegotiate current long-term pipeline contracts. Most of them will mature in the 2020s. Large scale floating LNG imports have now been chosen to address Turkey's fluctuating demand. To boost its position, Turkey already has announced plans for a possible two more FSRUs, one in Iskenderun on the south coast and/or Saros close to Istanbul. Main targets for them will be to increase buffer capacity to cope with very high daily demand.

The Aliaga FSRU can accommodate opportunities that arise in the oversupplied LNG market for the next five to ten years. Without contracted volumes, the FSRU can find the best deals in the market, which should lower Turkey's average gas-import price. Until December 2016, Turkey imported its gas via pipeline from Russia, Iran and Azerbaijan and under long-term LNG contract from Nigeria, Algeria and Qatar. However, the new FSRU will be able to source LNG from anywhere, and could even develop a regular supply from a new source country such as the US. At present, Turkey sources about 80 per cent of its supplies under long-term oil-linked contracts. Contracts for some 20 bcm are due to mature by 2025. The recent example of Lithuania suggests that the Aliaga FRSU will boost Turkey's bargaining power in its contract renegotiations.

TURKISH ENERGY STRATEGY

Even that global LNG market fundamentals are very promising, due to increased production and somehow fledgling demand growth, Turkey's LNG strategy is still very ambitious. To diversify its current and future gas supplies, Ankara has decided to contract additional volumes with increased flexibility.

The global LNG market is one of the strongest growing sectors, as more than 150 million tons of LNG per year are expected to enter the market between 2015 and 2020. The latter, which is a 50% volume increase, is largely coming from new entrants, such as Australia or Mozambique. Additional volumes could come also from Russia, Iran or even Qatar after that the latter has ended its production moratorium on the North Field. Unexpectedly, due to the ongoing shale gas (and oil) revolution in the USA, the latter is also entering in force the global market. First volumes have already arrived in the European market and even Turkey.

Increased volumes are very positive for current and future customers, but dramatic

changes in the market could put severe constraints on the overall commerciality of these projects the coming years. Due to increased volumes and slightly lacking demand for natural gas (and LNG), price levels have plummeted, almost on the same level as crude oil and petroleum product prices. These commercials have however increased overall LNG importing countries from 18 in 2005 to more than 35 at present. Reports have already stated that 20 new importers could enter the market by 2025.

Since several years, Turkey has been a growing LNG importer. A real important market position has been acquired in September 2016, when its first FSRU was available. With two main LNG terminals, Aliaga which is fully operational to gasify 16.5 million cubic meters (mcm) of LNG per day, and the Marmara Ereglisi to the west of Istanbul where three tanks can gasify 22.5 mcm a day at full capacity, but the terminal is currently only processing 18 mcm a day, LNG has become a part of the country's energy mix.

After decades of focusing on assessing pipeline gas projects, largely from Russia and Caspian-Central Asia, Turkey has stepped up its supply diversification. Based on normal market fundamentals, additional LNG volumes will put pressure on existing Russian pipeline gas, and indirectly increase also gas supply (Russian-FSU) to Europe.

Still, Turkish energy situation still is different from the European markets, where a lot of spare capacity exists and competition can be played against each other. Turkey still lags import capacity to have a real open market situation. At the same time, most pipeline and LNG contracts currently in place are long- or midterm contracts, leaving not a lot of room for a competitive market approach. Possible ideas to liberalize the gas market in Turkey are still in their infancy stage, while a spot market discussion is still far away.

As a trading hub, Turkey is geographically and physically very well placed. Turkey could for sure, ceteris paribus, take a European energy hub position, in the same way that has been targeted for decades by the Dutch (NW European Gas Roundabout). The availability of different gas supply options, Russia-Caspian-Iran (pipeline), Qatar-Algeria-US (Iran) LNG, and in future Egypt-Cyprus-Israel or even Lebanon offshore pipeline gas, is a substantial pre-requisite to become an energy hub. This should and could be enhanced by an increased amount of market players on the trading level.

The future from a Turkish standpoint is clear, diversification of natural gas supplies, combining traditional pipeline gas with LNG, while at the same time assessing and opening up possible local gas reserves on- and offshore. Still there are a growing amount of possible threats to the gas strategy, especially LNG supplies, as geopolitical issues and regional instability are increasing.

Looking at the economics first, threats have emerged to Turkey's energy hub targets. The Turkish energy market has been largely been based on natural gas pipeline supply. The last decades, Turkey has been expanding its natural gas pipeline infrastructure, with the announcement of the Trans-Anatolian Pipeline (TANAP) and the Turkstream Project. TANAP is currently the keystone in Ankara's ambition to become an energy hub. When becoming operational in 2018, it will connect Azerbaijani production via the Southern Gas Corridor to Greece and the European markets.

At the same time, Moscow and Ankara have revitalized Turkstream, which is a 910-kilometer natural gas pipeline, circumventing Ukraine and bringing gas to Turkey and the

rest of Europe. The project features construction of two lines, each with a capacity of 15.75 billion cubic meters of gas a year. The first is scheduled to be completed in 2018, with the second due to come on line the following year. Both pipelines will be available soon, supplying an increased volume to Turkey within a year.

These two new pipelines will increase competition of existing supply but also constrain possible discussions with new onshore suppliers, such as Iran or Iraq. Since years, Turkey is vying for Iranian gas supply, largely via existing pipeline infrastructure. The latter is available but flows are regularly interrupted.

Ankara is also still in discussions to access the developing gas projects in Kurdistan (Northern Iraq) and Israel (offshore). Both are available but political infighting and regional military-political issues are major stumble blocks for the foreseeable future.

Taking all of this into account, the most flexible gas supply is still LNG. This has been understood by Turkey to the fullest. However, project decisions and choices have been made without taking into account geopolitical and financial issues.

LNG DYNAMICS

When talking about LNG supply to Turkey, the usual suspects are on the table. Qatar, Algeria, Egypt, Nigeria and since short the US. After first choosing for the Nigeria-Algeria option, as the Arab Spring removed Egypt LNG, Qatar has popped up lately, even that its LNG was available. A growing bilateral relation between Turkey (President Recep Tayyip Erdogan) and Qatar has been laying the groundworks for this interesting option. The long-term LNG supply contracts have been a result of the latter. During President Recep Tayyip Erdoğan's visit on Dec. 2, 2015 to Qatar, a preliminary memorandum of understanding was signed between Turkey's Petroleum Pipeline Corporation (BOTAŞ) and the Qatar's national oil company to ensure Turkey's long-term and regular LNG imports from Qatar.

Qatari Energy and Industry Minister Mohammed al-Sada said the last months that within the framework of its two existing agreements with Turkey, Qatar is ready to ship LNG at any requested amount. There are at present restrictions on quantities. Recalling that their relations with Turkey have continued in accordance with such an understanding in the past, he confirmed that the relations will continue in the same way in the future. Al-Sada said: "Qatar always prioritizes Turkey. This prioritization is based on our excellent relations in every area not only in energy." The share of Turkey's total spot LNG imports in total natural gas imports is around 5.15 percent. While Turkey imports spot LNG from seven different countries, it supplies 68.5 percent of these purchases from Qatar.

QATAR CRISIS & POLITICS

This situation could however become extremely constraint by ongoing regional intra-Arab power politics. The ongoing isolation by its main neighbors, Saudi Arabia-UAE-Bahrain, in combination with Egypt, is presenting Qatari LNG future prospects with a dilemma. A political and economic isolation of Qatar, due to its relatively friendly relations with Iran and others, in combination with perceived pro-Muslim Brotherhood

support, could lead to a deterioration of Qatar's LNG and gas export potential the coming months and years. Turkey's reliance on a Qatari LNG supply could be hit very hard, taking into account the continuing power play in the Gulf region. This could directly and indirectly put Turkey under pressure, as Arab countries could be increasing pressure on Qatari LNG clients too.

At the same time, the Turkish gas market (and energy hub) will also need to reassess part of its current strategies if East Med gas projects are coming online and will target European clients. As Egypt already has stated lately new gas discoveries will be announced in H2 2017. Cairo has already reiterated that it plans to restart major gas exports in 2019. Part of these new volumes are based on the Zohr natural gas field discovery in 2015 (ENI) offshore Egypt. With around 850 bcm in natural gas reserves, Zohr has been the largest find in years. From the start it was clear that a large portion of the new discovery would be meant to supply local Egyptian gas demand. Exports could be feasible but would be reasonably small. Several new finds have popped already in the Shorouk Concession, large enough to supply existing LNG plants. A combination of Egypt offshore and gas supplies from Cyprus and Israel, will push Egypt back into the major league of LNG exporters. For Turkey this would have been a boon, if politics and regional conflicts would not have taken a turn for the worse. Egypt LNG as an option for Turkey to access is at present out of reach. As long as the Turkey-Egypt relationship is under severe pressure, Cairo's LNG volumes will be heading directly to Europe. Ankara will need to take this into account, as it is going to have an impact on Turkey's energy hub position the next years.

To make things worse, Egypt's rapprochement with Turkey's main gas supplier, Russia, also will have an impact. At the end of 2016, Russian gas company Rosneft acquired a 30% stake in the Zohr field from ENI. The latter is seen by most as a major sign for an in-depth cooperation between Putin and Egypt's president Sisi. The latter already stated that this would be in all fields. A full-fledged Russian-Egyptian LNG approach towards Europe will result in negative repercussions for Turkey's energy hub position. As one analyst already stated, "Russia's growing involvement in an expanding Egyptian natural gas industry will likewise impact a range of thorny issues from the Turkish Stream project to the Cyprus reunification negotiations".

Looking at the current regional situation, the Turkish energy position, especially its LNG supply options, are under threat. Even that Russian president Putin has stated that Russia will not be forced to take a position in the ongoing political crisis between Qatar and the Saudi-Egypt-led Sunni Arab coalition, it will be having an influence on Turkey also. Putin's MENA strategy is based on playing a chess game, in which he will be willing to offer pawns or even queens to gain the upper hand in the end. The brewing confrontation in the Gulf Arab region has also pulled in Turkey already. Due to the perceived positioning by Turkish president Erdogan as an ally of Qatar, a negative reaction of the others has already been clear. The leading anti-Qatar front members have already cut part of their discussions with Turkey in several fields, especially security and finance related sectors. Analysts are now looking at the options that the anti-Qatar coalition are going to use to put pressure on Doha's allies. Qatar's LNG supplies to Europe and Turkey have not yet been affected. Egypt even still has kept its Suez Canal open for all Qatari vessels. However, this could change due to the confrontational course being

taken by both sides. A possible shipping blockade on Qatari LNG would directly affect Turkey.

RESULTS

Potential other restrictions to Turkey could follow, if the anti-Qatar coalition will heat up the conflict further. Other LNG exporters, such as Algeria or Nigeria, would be pushed by their OPEC compatriots to support the Saudi-Egyptian position. Turkey itself could also become a target. Saudi and Emirati investments or defense contracts could become a major pressure instrument to be used. Without using a bullet, Turkey's security of energy supply could be hurt immensely.

Ankara also should not be looking at Moscow to get them out of this rough spot. Russia's current economic situation has become extremely intertwined with the future strategies of OPEC (Saudi Arabia) and Arab sovereign wealth fund investments (QIA, SAGIA, ADIA). Saudi Arabia and the UAE have become major investors in the Russian economy, including the latter's oil and gas sectors. Qatar has done the same, taking a major stake in Rossneft, but geopolitically Saudi Arabia – UAE are more important. Moscow also has stakes in Libya, Egypt and even Israel.

Looking at the current situation, Ankara still holds a pivotal role in the energy future, not only of its own country, but also of Europe in the end. The specific position available for Ankara's energy hub dreams, partly being supported by LNG projects, is however under threat. A chess-game is being played at present, in which Turkey will be asked not only to secure its own energy future, but also to still be available as an energy hub between East-West and the Middle East.

IRAQ: GOING BACK AND FORTH

Burak Kayael

INTRODUCTION

When a foreigner looks at Iraq, he/she may only see war, destruction and chaos. It may be true to speak desperate words about country's future but still its past should be well determined before criticizing today and future. Iraq has been living extraordinary events within the last decades. Tyranny, two Gulf Wars, internal conflicts, ISIS terrorism and Kurdish independence acts. All these scenes negatively affected Iraq's destiny and its performance on being a strong country.

After Second Gulf War had started in 2003, Iraq fell into pieces. Lack of unifying governments and failure of nationalism ramped up the tension between different partitions of country. This brought the people to the edge of civil war and then, triggered ISIS terrorism. We should be looking into Iraq's future in energy in the light of these cases.

HOW IS IRAQ DOING RIGHT NOW?

Iraq has increased its oil production more than 100% compared to 2006 rates. Although it seems like Iraq is doing well in oil production we can easily say it is not even close to its potential. Iraq produced 4.4 million barrel/day average in 2016 and now producing between 4.5 – 4.6 million barrel/day in 2017. Most of its production is being done in southern fields (around Basra) and directly being sold via Basra port to international markets. Around 600 – 650 thousand barrel/day production of self-autonomous Kurdish region is included in these numbers.

The reasons for expressing "not even close to its potential" are that many proven fields waiting for tenders/investment, western section of country barely explored, Kurdish area not being invested sufficiently and of course low oil prices. High oil prices encouraged oil companies and countries relying on oil revenues in recent years. But sudden decrease in same, took many of those in descent ways. Iraq is no exception for those who had dreamed of making more money with high oil prices. This fallen dream hinders country's planned investments.

Because of that Iraq cabinet choses Technical Service Contract (TSC) type instead of Production Share Contract (PSC) to sign with IOCs Iraqi government should always have strong budget to pay IOCs their bills. To clarify the difference between a TSC and PSC; in TSC the IOC accepts getting fixed fee per barrel from Iraq's NOC, making it a "contractor" actually, where in PSC both sides (NOC and IOC) become equal partners (proportional to their stakes) and share oil sale revenues between each other. Picking TSC was logical for Iraq to have more authority on reserves and making more profit from sales but dropping prices undermined this plan and forced Iraqi government to revise the contracts.

Iraq's debt to IOCs was 20 billion in 2015. In 2017 budget Iraqi government announced that $85.2 billion expenditure is planned although $67 billion revenue is expected (according to $42 per barrel average oil price expected). This will cause more than $18 billion deficit which will for sure hinder payments to IOCs. The government offered IOCs to extend their contracts to balance the negative effects of low oil prices on federal budget and IOCs. It was announced that some companies accepted this offer.

Another hindering issue for Iraq is ISIS terrorism. As per all countries fighting with terrorism Iraq spending lots of money to fund its troops and buy weapons/ammunition. Since ISIS invaded Mosul in 2014 a tremendous fight is being given against this bloody terrorist organization. Billions of dollars spent on war instead of investments, make Iraq more dependent on external funds and aids. In 2017 budget government was relying on $4.7 billion of foreign and domestic loans. It is really difficult for Iraq to stand still with this kind of economic problems.

In addition to these economic problems Iraq is facing with a unity issue raised by Kurds living in the northern sections. Kurds were fighting for their independency for many years and they gained self-autonomy after First Gulf War with support of U.S.A. ISIS fight which was weakening power of Iraqi federal government, helped Kurdish government to level up their voice about independency. Using their fight against ISIS Kurdish government received almost infinite military and political support from many countries. This support encouraged them to talk on their independence from Iraq and they decided to conduct a referendum on September 25th, 2017.

All above listed reasons make Iraq more and more dependent to other countries. For example, Iraq is dependent to Turkey for agricultural and industrial products, dependent to Iran for natural gas, dependent to U.S.A. and other funding countries for external loans. This makes it fragile internally and externally. All these dependences cause Iraqi government make concessions to these countries. But two of these countries step forward to influence Iraq, Iran and U.S.A.

The invasion of Iraq in 2003 by U.S.A. ended up with global giant's defacto supremacy in the country. The chaos generated by the invasion cause more dependency to the invader which we can also call this an addiction. U.S.A. achieved its goals by getting Iraq's oil market open to IOCs, creating pseudo chaos in Middle East and settling there permanently with military bases.

It might seem crazy when we call Iran has one of the biggest influence on Iraq because two countries fought for 8 years (1980-1988) and hundreds of thousands of people

died from both sides. But Iran cleverly sneaked into Iraqi diplomacy by using anti-Sunni regime raised by U.S.A. Having the majority of Iraqi citizens as Shia originated, Iran got easily influenced into Iraqi governments and bureaucracy. By doing this, also with the help of released sanctions previously applied by international organizations, Iran now can sell natural gas to Iraq for its power plants, buy oil from Iraq for itself and threaten Iraqi governments via pro-Iranian groups.

KURDISH INDEPENDENCE, IS IT REALISTIC?

It's been bright as the sun that Kurds in Iraq are willing to gain their independence for many decades. But it was impossible for them to realize this until Saddam Hussein was overthrown from country's leadership. Federalization in Iraqi constitution dated 2005 let them have legal rights to act more freely and work on their independence. When ISIS attacked on Kurds many depressing and brutal scenes occurred. But IKRG (Iraq Kurdish Regional Government) stepped forward to fight against ISIS and start to collect trophies for this. They received state-of-the-art weapons and ammunitions from many countries all over the world. Not only the weapons they received but also the political support they gained was priceless for them.

Relying on the political support they have Kurdish president Mesud Barzani announced that they will conduct an independence referendum on September 25th, 2017. Many different comments expressed for the referendum from different parts of the world. Iraq (federal government), Turkey, Iran and U.S.A. announced that they are not supporting any independence action in Iraq. There are also some opponent voices came up from these countries, supporting this desire. On the other side, there is one country giving full support to Kurdish independence, Israel. Israel supports Kurds in the light of their policy, having small and weak neighbors. Splitting up Iraq into two or more parts will surely weaken its military and political strength. Differently from these states Russia and some European countries like Germany and France do not make any comment on this issue. This should be interpreted as they will watch the action on field and act accordingly.

Russia is stepping forward in this group with its recent activities. Russian oil companies are active in both IKRG and federal government's areas. A major Russian operator company recently kicked off investments in Kurdish area including exploration and transportation projects. This can be a silent investment to independence of Kurds.

We all know that independence won't stand long without having money. This is why IKRG is selling crude oil to international markets since 2012 without permission of Iraqi federal government. Many European and Middle Eastern countries are in the list of customers for this oil. The main reasons for this are that IKRG is selling its oil cheaper than the market values to find customers easier and also it desperately needs every cent it can get. Although billions of dollars earned from this trade, heavy corruption in Kurdish region and unbalanced financial payload on Kurdish government (caused by officer salary payments and fight against ISIS costs) blocks the way of economic independence. IKRG borrowed hundreds of millions of dollars from foreign countries like Turkey and U.S.A. But the deficit in the budget sucks all money borrowed like a black hole.

In the light of mentioned factors; even though the independence referendum is conducted (with an expected "Yes" result) the outcome is hard to be applied. It can be used to force federal Iraqi government to acquire more legal power. Even if Kurds insist on being independent they may face up with closed borders in each side of their "New Country". Because of this they may prefer being more autonomous and more powerful but still a part of Iraq.

WHAT IS NEXT FOR IRAQ?

Iraq has the highest potential for affecting oil related balances in Middle East. By stabilizing its political and economic situation it can change its own destiny and become a wealthy state. But to be like this it has miles of distance to go and lots of things to do.

To brighten the potential let's look at some numbers:

- Iraq has 9% of proven oil reserves of world (more than Libya, Russia, Nigeria and U.A.E.) which is equal to 153 billion barrels
- Iraq is producing only 4.8% of oil produced (4.5 million barrels per day)
- Iraq has 2% of proven natural gas reserves of world (3.7 trillion m^3)
- Iraq is producing less than 0.05% of gas produced (1.1 billion m^3)
- Almost 50% of the country was explored for hydrocarbons, rest is awaiting

First of all, Iraq has to unify its citizens no matter what. Arabs, Kurds, Turkmens, Shias, Sunnis, Christians shall unite to make Iraq stronger for internal and external interventions. After unification Iraq should win the fight with terrorism and maintain security. Parallel to these actions an economic revolution should be run to minimize corruption and to maximize all kind of investments.

Unless these actions are taken, Iraq will fell in parts or most likely become a "Satellite State" to other countries. It will be neo-colonized by powerful states, like by its neighbors or global super-powers.

Turkey should help Iraq and co-operate with it for its needs. Both countries can mutually take advantage of each other's necessities. Turkey can help Iraq to build its infrastructures and superstructures in today's technology and Iraq can help Turkey to purchase hydrocarbons more profitable. Turkey can be an irreplaceable partner of Iraq in its future.

NUCLEAR POWER, ITS WASTE IN THE WORLD AND IN TURKEY

By Fatih TEMİZ

INTRODUCTION

Nuclear power plants were born in 1950s. Taking only 30 grams of used fuel annually for a person's energy consumption many countries built their own nuclear power plants. In this story, there is the fuel on one hand and the waste on the other. In general sense, used up fuel rods from nuclear reactors and the waste from reprocessing plants are referred to as nuclear waste. These wastes can be stored for decades in the cooling pools of nuclear reactors (world-nuclear.org). Nuclear power plants are only one source of nuclear wastes, the others are medicine, research facilities, oil and gas extraction, mining, etc. Not all of this waste is produced inside reactors, but they come from concentrated natural structures. This waste is divided into three categories, yet, the boundaries between the categories differ from country to country.

- High Level Waste (HLW): This waste is still very radioactive and continues to produce heat. Only 2% of nuclear waste falls into this category but 98% of radioactivity comes from this. They are transported by dry cast storage containers which weigh 100 tons when empty and can contain 12 tons of HLW and cost €1.5 million each. If used reactor fuel is to be reprocessed, the final liquid HLW product needs to be solidified. This product is made into a glass of borosilicate.
- Intermediate Level Waste (ILW): It usually comes from reprocessing plants, research facilities and turned-off reactors. They are transported by several cylindrical containers that are painted yellow for identification. The wastes are compressed to save from volume.
- Low Level Waste (LLW): This category is still radioactive and produces a small amount of heat but does not require cooling. The majority of all nuclear wastes are considered LLW. Like ILWs, they are transported by several cylindrical containers that are painted yellow for identification. The wastes are compressed to save from volume.

Nuclear Waste	Share	Radioactive content
HLW	3%	95%
ILW	7%	4%
LLW	90%	1%

Table: Nuclear waste categories (world-nuclear.org)

Some of the nuclear waste keep generating heat, some of HLW and ILW can heat up their close surrounding up to 200°C. Next, not only nuclear power plants but also medical centers, industry, and the military produce nuclear wastes.

Nuclear waste cannot be recycled like conventional wastes. They are carried to repurposing plants to gain plutonium which is used for building weapons. There are only two such facilities in Europe, one in England (accepting waste from the UK, Japan, Germany, Switzerland, Spain, Sweden, Italy, the Netherlands and Canada) and one in France. Yet, not all states carry out repurposing, for example, Germany banned transportation of nuclear waste to reprocessing plants in 2005 since they see it hazardous to the environment. Plutonium oxide is sometimes mixed with uranium oxide that gives us MOX, mixed oxide fuel (world-nuclear.org). Technetium-99 containing liquid LLWs can be discharged into the sea. This tracer isotope can be distinguished for hundreds of kilometers. However, the amount of radiation received is lower than naturally occurring background radiation (world-nuclear.org). For the special case of the USA, an MIT study on nuclear power summarizes the current situation as follows (The Future of the Nuclear Fuel Cycle, 2011).

- Nuclear waste cannot be destroyed; therefore, a permanent repository is needed.
- Spent nuclear fuel from LWRs can be processed in order to recover the fissile and fertile parts to be reused in forthcoming days.
- Waste management did not occur as an integrated part of fuel cycle.
- There is no integrated waste management plan in the USA for nuclear wastes.
- Waste management in the USA saw practical and official letdowns.

Afterwards, generating power from uranium requires an extra step: enrichment. Only 7 parts in 1,000 uranium atoms are the required isotope of Uranium-235 that is fissile. From 7/1,000, enrichment takes the concentration to 2 to 4% in a process which also produces depleted uranium which cannot be used. In the end, for every 1 ton of enriched uranium, 7 tons of depleted uranium is formed (Seibert, Nuclear Waste).

Depleted uranium is stored as uranium hexafluoride which is a gas that is radioactive and highly toxic. Scientists are still in search of disposal methods for this gas as only in the USA approximately 700 kilotons of it is stored (ead.anl.gov). Adding more to the problem, uranium hexafluoride reacts with water to produce the corrosive hydrofluoric acid (Piper, G., 30.6.2007). There is a disputed traffic of uranium hexafluoride from Europe to Russia. Russian institutes can enrich uranium hexafluoride further which then comes back to Europe. German ARTE TV broadcasted a documentary on this issue in the past decade showing satellite images of uranium hexafluoride containers even with-

out a roof over them (Seibert, Nuclear Waste).

VOLUME AND COST OF NUCLEAR WASTE

Handling and disposing of nuclear wastes characteristically make up of 1/20 of the total electricity production (world-nuclear.org).

The table below shows the amount of nuclear waste generated in the last 50 years. The table excludes the spent fuel left.

	High-level Waste (m3)	Greater than Class-C Low-level Waste (m^3)	Low-level Waste (m^3)	Cesium and Strontium (m^3)
Once-through fuel cycle	70,990	2,500	367,500	0
Reprocessing with fast reactors	55,000	416,500	2,677,500	5,655
Reprocessing with thermal and fast reactors	54,000	400,500	2,449,500	5,655

Table: Amount of nuclear waste generated in the last 50 years (ucsusa.org)

There are unforeseeable costs of nuclear waste disposal. There are huge cost issues. The Nuclear Decommissioning Authority in the UK assumes the cleaning up process would take somewhere between £95 and £219 billion. These figures are derived from the readily available data. As more data is obtained the scale of the clean-up will be clearer (theglobaldispatches.com). The media adds to the story, that, £43 billion was the cost estimate yet now the government sees that £48 is necessary to clean-up Britain's nuclear waste. A new body is required to be founded in order to carry out and regulate this massive campaign. For the next 10 to 15 years an additional £1 billion is required each year for the project (dailymail.co.uk).

German nuclear power plants will need decades to dismantle their plants. The government agreed on to be responsible for the waste disposal and the fund will receive around €24 billion. Wolfgang Irrek, professor for energy management at Ruhr West University of Applied Sciences in Germany, says that cost estimation is not possible for waste management and disposal since we are not aware of a technical notion (theglobaldispatches.com).

200 to 350 m^3 of LLW and ILW are produced annually by a 1,000 MWe light water reactor. Also, 27 tons of used fuel is discharged every year from the same facility. When put into storage units, it contains 75 m^3 of space and after reprocessing 3 m^3 of HLW is

produced which takes 28 m^3 of space in encapsulations (world-nuclear.org).

More than 1.5 million tons of depleted uranium is stored. 300 kilotons of used nuclear fuel is stored and around 270 kilotons of it is stored in pools but dry storage is growing. Every year more than 10 kilotons of new used fuel emerges and 2 kilotons of it goes under reprocessing (world-nuclear.org).

Robert Alvarez, senior policy adviser to the Secretary of Energy during the presidency of Clinton, brings the Fukushima example back. After the explosions at the Fukushima Dai-Ichi station spent fuel pools were left without a roof over them. The owner of the plant, Tokyo Electric Power, uses enormous amounts of water to keep the station cool. An amount of 65,000 tons of spent fuel of which ¾ of it is sitting in American nuclear power plant pools may catch on fire and explode just like in Japan.

Alvarez takes down the suggestion of stocking all of this waste under a football field. He comments that there would be enough plutonium to fuel 150,000 nuclear weapons, dwarfing Chernobyl and Fukushima accidents. If anything goes wrong, this would be deadly to thousands and perhaps millions of people. The adviser recommends taking any spent fuel older than five years old into dry and hardened storage containers just like in Germany. This would take a decade costing $3.5 to $7 billion, then giving an additional increase of $0.004/kWh for consumers (thenation.com).

SOLUTION IDEAS

Long term solutions are offered by scientists. The space, the core of the earth, the bottom of the ocean are candidates for nuclear wastes:

- **The space:** Putting the nuclear wastes into a rocket and shooting them into space seems straightforward. Yet, the cost effect is immense. It is calculated that for every unit of electricity produced for that given amount of nuclear fuel, we need 5 times the energy to get rid of it using this method. Also, just imagine that something goes wrong and the rocket explodes over our heads – catastrophe!
- **The core of the earth:** We are not actually aiming for the core here, but a safe depth that the nuclear wastes would not come back to surface. So far, we did not even reach 13 km of depth and going past that with today's technology does not seem possible.
- **The bottom of the ocean**: It was believed that contaminated water from the bottom of the ocean would take millennia to reach the surface, however, recent studies show it takes less than 800 years. Also, the cement and glass containers dissolve. Still, since 1967 IAEA states 100 kilotons of nuclear waste was dumped into the oceans in this sense.

More options for long-term waste management are listed below. Some ideas are out of date. some of them are still being discussed.

Ideas	Examples
Long-term above ground storage	Investigated in France, Netherlands, Switzerland, UK and USA. Not currently planned to be implemented anywhere.
Disposal in outer space (proposed for wastes that are highly concentrated)	Investigated by USA. Investigations now abandoned due to cost and potential risks of launch failure.
Rock-melting (proposed for wastes that are heat-generating)	Investigated by Russia, UK and USA. Not implemented anywhere. Laboratory studies performed in the UK.
Disposal at subduction zones	Investigated by USA. Not implemented anywhere. Not permitted by international agreements.
Sea disposal	Implemented by Belgium, France, Federal Republic of Germany, Italy, Japan, Netherlands, Russia, South Korea, Switzerland, UK and USA. Not permitted by International agreements.
Sub seabed disposal	Investigated by Sweden and UK (and organizations such as the OECD Nuclear Energy Agency). Not implemented anywhere. Not permitted by international agreements.
Disposal in ice sheets (proposed for wastes that are heat-generating)	Investigated by USA. Rejected by countries that have signed the Antarctic Treaty or committed to providing solutions within national boundaries.
Deep well injection (for liquid wastes)	Implemented in Russia for many years for LLW and ILW. Investigations abandoned in the USA in favor of deep geological disposal of wastes in solid form.

Table: Other ideas for disposal (world-nuclear.org)

Dry casks are seen as a short-term solution. Waste pools inside nuclear power plants became overcrowded as they store the nuclear waste until it is cool enough to be handled and carried. Then come the idea for repositories. The Nuclear Waste Policy Act of 1982 of USA stated the obligation to start carrying nuclear waste to a repository assigned by the federal government by 1998. Yet, no such permanent place has been assigned (ucsusa.org).

The Nuclear Regulatory Commission asked nuclear power plants to store up to 5 times the waste what they were designed for. Since the USA failed to designate a permanent repository the problem continues (ucsusa.org). Furthermore, before President Obama cancelled the Yucca Mountain project, President Bush wanted to speed things up for the repository. However, there was not satisfactory evidence on how safe the project would be. The project was proposed to contain radiation for 10 millennia but the federal court ruled that it should provide protection for 1 million years (scientificamerican.com). Transportation of such wastes across the USA gives birth to other risks as well that fears the citizens.

Moreover, worries continue climbing as more accidents happen. Just in May 2017,

state of emergency was declared in Hanford, Washington in USA after a tunnel collapsed which was used to store radioactive materials and equipment (rt.com). The Yucca mountain project for a permeant repository is still under debate (ucsusa.org) although President Obama cancelled the project USA still is in search for a new designated area.

A leap occurred in Finland. The Finns are building their permanent repository on Olkiluoto Island. The project is for the next 100 millennia. After that? We are not sure (theglobaldispatches.com).

Each country takes things into their own measures. Here is a table of approaches of different countries.

Country	Policy	Facilities and progress towards final repositories
Belgium	Reprocessing but moving to direct disposal	Central waste storage at Dessel Underground laboratory established 1984 at Mol Construction of repository to begin about 2035
Canada	Direct disposal	Nuclear Waste Management Organisation (NWMO) set up 2002 Deep geological repository confirmed as policy, retrievable Repository site search from 2007, planned for operation by 2035
China	Reprocessing	Central used fuel storage at Lanzhou in central Gansu province Repository site search from 1986, selection to be completed by 2020 Underground research laboratory 2015-20, disposal of HLW from 2050
Finland	Direct disposal	Program start 1983, Posiva Oy set up 1995 to implement confirmed policy of deep geological disposal Underground research laboratory Onkalo under construction since 2004 Repository being built from this, near Olkiluoto, to open in 2023
France	Reprocessing	Underground rock laboratories in clay and granite Parliamentary confirmation in 2006 of deep geological disposal, containers to be retrievable and policy 'reversible' Construction and operating licence for Bure expected in 2018, construction to start 2020
Germany	Reprocessing but moving to direct disposal	Repository planning started 1973 Used fuel storage at Ahaus and Gorleben salt dome Geological repository may be operational at Gorleben after 2025, decision due 2019
India	Reprocessing	Research on deep geological disposal for HLW
Japan	Reprocessing	Used fuel and HLW storage facility at Rokkasho since 1995 Underground laboratory at Mizunami in granite since 1996 Used fuel storage built at Mutsu, expected to open 2018 NUMO set up 2000, site selection for deep geological repository under way to 2025, operation from 2035, retrievable
Russia	Reprocessing	NO RAO set up in 2012 to manage HLW and its disposal Underground laboratory in granite or gneiss in Krasnoyarsk region from 2015, may evolve into repository by 2024 Pool storage for used VVER-1000 fuel at Zheleznogorsk since 1985 Dry storage for used RBMK and other fuel at Zheleznogorsk from 2012 Various interim storage facilities in operation

Country	Policy	Facilities and progress towards final repositories
South Korea	Direct disposal, wants to change	Waste program confirmed 1998, Korean Radioactive Waste Management Co. (KRWM) set up 2009 Mid-2013 KRWM rebranded as Korean Radioactive Waste Agency (KORAD) Central interim storage facility pending construction
Spain	Direct disposal	ENRESA established 1984, its plan accepted 1999 Central interim storage at Villar de Canas from 2016 (volunteered location) Research on deep geological disposal
Sweden	Direct disposal	Central used fuel storage facility – CLAB – in operation since 1985 at Oskarshamn Underground research laboratory at Aspo for HLW repository Östhammar site selected for repository (volunteered location), likely to open in 2028
Switzerland	Reprocessing	Central interim storage for HLW and used fuel at ZZL Würenlingen since 2001 Smaller used fuel storage at Beznau Underground research laboratory for HLW repository at Grimsel since 1983
United Kingdom	Reprocessing	HLW from reprocessing is vitrified and stored at Sellafield Repository location to be on the basis of community agreement New NDA subsidiary to progress geological disposal
USA	Direct disposal	Policy since 1977 to forbid reprocessing DoE responsible for used fuel from 1998, accumulated $40 billion waste fund Considerable research and development on repository in welded tuffs at Yucca Mountain, Nevada The 2002 Congress decision that geological repository be at Yucca Mountain was countered politically in 2009 Central interim storage for used fuel now likely

Table: Country-specific policies (world-nuclear.org)

PUBLIC COMPLAINTS AND THE GREENHOUSE EFFECT

Another complaint with the nuclear wastes comes in the transparency field. Citizens speak out that they are not aware of the route of nuclear wastes and the authorities say the path is kept secret to avoid any attacks on the wastes. This makes it impossible for the citizens and emergency planning if something goes bad. When contained properly, these wastes are safe to carry, on the other hand, if there is a leakage then it is an enormous hazard for the environment and since there are only a few reprocessing facilities in the world, international transport of these wastes takes place continuously.

In USA, the government failed to open a permanent repository. The companies started suing the government as it did not comply with its promises. Still, there is a large grey area where people do not know what to do with their nuclear wastes. The overcrowded amounts piled in-situ damage facilities. Correspondingly, it is unclear till when this will continue as it is (ucsusa.org).

The other problem is that nobody wants the nuclear wastes in their backyard – NIMBY as an acronym. Yucca Mountain repository in Nevada was opposed by the Nevadans themselves. Only 130 km away from Las Vegas, citizens are worried about possible earthquakes and erosions altering the natural formations and bringing havoc into the area for thousands and thousands of years to come. Once the repository becomes unstable, the radioactivity will be a constant hazard carved into the area (scientificamerican.com).

Mycle Schneider, the lead author of the annual World Nuclear Industry Status Report suggests that geological storage is eternally well. He thinks it is an arrogant approach to say a facility will hold up for tens of thousands of years. The scientist also adds that the European approach of getting cooled waste out of water into dry storage as soon as possible is a better option, yet, the water should never be permitted to escape. Otherwise, we could be talking about much larger catastrophes than the one in Chernobyl (theglobaldispatches.com).

Personally speaking, I was only a 1-year old baby when the notorious disaster in Chernobyl occurred. As, the human kind, we did not know how to handle that havoc, three decades later, we still do not. Nuclear power is a project that does not end in a few centuries. As Ruby Russel states the issue, it is a project for a million years (theglobaldispatches.com).

German Chancellor Angela Merkel stated that Germany will switch off all of their nuclear power plants by 2022 in favor of green energy. In 1977, Germany was a forerunner of disposal as Gorleben salt mine was suggested to be a repository. Years and years of discussions later, the government took the issue back into their agenda in 2017. The project is expected to be built in 2050. This very example shows us the intensity of discussions, complaints, and objections rising. From suggestion to building, the repository needs almost 80 years.

In France, it is debated that the public was not properly consulted over the proposal of building a repository in the village of Bure. Protests are growing. In addition, the parliament is expected to take a vote on the issue (theglobaldispatches.com).

Last year, in 2016, nuclear power plants generated more than 2,400 TWh of electricity which provided around 11% of the global consumption. It is calculated that even if the cleanest fossil fuel, i.e. natural gas, was employed to produce the same amount of energy, an extra amount of 2.4 billion tons of CO_2 would be in the atmosphere, this is roughly equivalent to a quarter billion cars on the road (world-nuclear.org).

Energy Source	Lifecycle emissions (gCO_2eq/kWh)	Estimated emissions to produce 2,417 TWh electricity (million tons of CO_2)	Potential emissions avoided through the use of nuclear power (million tons of CO_2)
Nuclear Power	12	29	N/A
Gas	490	1,184	1,155
Coal	820	1,981	1,952

Table: CO_2 emissions avoided through the use of nuclear power (world-nuclear.org)

In the report "IEA finds CO_2 emissions flat for third straight year even as global economy grew in 2016", it is stated that nuclear power plants helped in stagnating the CO_2 levels along with an increase in natural gas consumption. China, the United States, South Korea, India, Russia, and Pakistan connected new nuclear power reactors to their power grids (iea.org). The table above confirms the amount of greenhouse gas inhibited before it is generated by switching from coal to nuclear power.

NUCLEAR POWER IN TURKEY

Every year an increase in energy demand of more than 5% occurs in Turkey. The country demands to increase variety of energy sources. Turkish Ministry of Energy and Natural Resources lists in their report why the country is looking forward to opening their first nuclear power plants in the near future (Nuclear Power Program and NPP Projects in Turkey, March 2013).

- Nuclear power does not depend on climatic conditions
- Nuclear power does not emit as much greenhouse gases as fossil fuels
- Millions of tons of carbon dioxide, sulphur dioxide, nitrogen oxides, and ash will be eliminated
- Less amount of fuel is used than in conventional methods resulting in less contamination and waste
- Nuclear fuel already spent can be repurposed and reused
- Nuclear power brings new jobs
- Life of nuclear power plants is longer than other power plants

The same report claims that Turkey's potential for generating electricity would not suffice the growing energy demand and the country needs to build its first nuclear power plant. As seen in the table below, Turkey is not the only nation looking forward to produce nuclear energy.

Region	Country
Europe	Greece, Italy, Poland, Portugal, Turkey
Eastern Europe/Eurasia	Albania, Belarus, Croatia, Estonia, Georgia, Kazakhstan, Latvia
Middle East	Bahrain, Jordan, Kuwait, Qatar, Saudi Arabia, Syria, UAE, Yemen
Asia	Bangladesh, Indonesia, Malaysia, Mongolia, Myanmar, Philippines, Singapore, Thailand, Vietnam
North Africa	Algeria, Egypt, Libya, Morocco, Tunisia
Sub-Saharan Africa	Eritrea, Ghana, Kenya, Namibia, Nigeria, Senegal, Sudan, Tanzania, Uganda
Latin America	Chile, Cuba, Dominican Republic, Ecuador, Jamaica, Paraguay, Peru, Uruguay, Venezuela

Table: Nations interested in building their first nuclear power plants (Jewell, 2011)

For four decades, Turkey showed her intentions for getting nuclear power plants. The first nuclear power plants will be foreign-built. The first one is going to be built in Akkuyu (received a 49-year electricity generation licence, valid until June 2066) in southern Turkey by Russians starting in 2018 (world-nuclear-news.org). The second one is going to be constructed in Sinop in the north by a French and Japanese consortium. Then, the third one is expected to be built in İğneada by the Chinese.

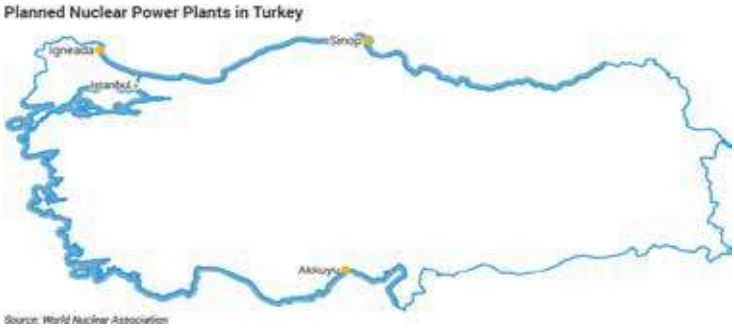


Image: Planned nuclear power plants in Turkey (world-nuclear.org)

A nuclear reactor was built at Istanbul Technical University in 1979. Turkish Atomic Energy Authority regulates the reactor. The other reactor built in 1981 (TR-2) of 5 MWe is located in Çekmece in Istanbul (world-nuclear-news.org).

As a net importer of natural gas and oil, Turkey (importing more than 90% of both hydrocarbons) is looking for means of energy production to secure her position and security.

Almost half of Turkey's energy production comes from natural gas and about 30% of it comes from coal. In the country, the energy demand grows by 8% each year and the expected amount of investments required to secure energy supply is about $100 billion by 2023. Alternative sources of energy are sought to lower dependency on Russian and Iranian natural gas. A 4.8 GWe of nuclear capacity is on its way.

Turkish Atomic Energy Authority (TAEK) sets the criteria for building and operating the plants since late 2007 as a new law concerning Construction and Operation of Nuclear Power Plants and Energy Sale was passed by the parliament. Then, in late 2013, IAEA prepared a report which came positively on Turkey, nevertheless, endorsed finalizing a national plan on nuclear energy, solidification the regulatory body, and evolving a national strategy for human resource development.

Reactor	Type	MWe gross	Construction Start	Operation Start
Akkuyu 1	VVER-1200	1200	2018	2023
Akkuyu 2	VVER-1200	1200	2019	2023
Akkuyu 3	VVER-1200	1200	2020	2024
Akkuyu 4	VVER-1200	1200	2021	2025
Sinop 1	Atmea1	1150	2017	2023
Sinop 2	Atmea1	1150	2018	2024
Sinop 3	Atmea1	1150	?	?
Sinop 4	Atmea1	1150	?	?
İğneada 1-4	AP1000x2 CAP1400x2	2x1250 2x1400	?	?

Table: Planned nuclear power plants in Turkey (world-nuclear.org)

Akkuyu location received its license years ago. Sinop's advantage is that the sea water is around 5°C cooler than in Akkuyu making it more efficient. Then, İğneada is chosen to be close to Istanbul, the biggest city in Turkey.

In central Anatolia, the Temrezli deposit contains uranium. Both national and international companies are seeking to work in the site. The studies on the site showed that the cost of uranium extraction will not be higher than in other sites. Extraction costs are expected to be around $37/kg U_3O_8 (also known as "yellowcake"). Resources measured at the Temrezli are a little more than 2,350 tU of which is 1,170 ppm U. Tulu Tepe, Akcami, Delier, and Sefaatli are other candidates for uranium extraction.

Wastes produced at Akkuyu were requested by TAEK to be taken back to Russia in the beginning. Later on, as of 2014, the issue was not clarified (world-nuclear.org).

CONCLUSION

ILW and LLWs are transported without a hassle but when HLWs are carried it makes into the news.

Wastes are generally national and countries want to keep things to themselves for security and independence measures.

Reprocessing gives nuclear pollutants into the air and water which are carried globally. Nuclear waste problem never stays local but it becomes a global issue. Under ideal conditions everything seems perfectly fine, however, when there is an accident, a leakage, or an efficacious attack, things give birth to a catastrophe (Seibert, Nuclear Waste).

The MIT report on the problem brings the following recommendations (The Future of the Nuclear Fuel Cycle, 2011).

- A risk-based waste management plan is wanted.
  - A waste classification system is necessary.
  - For each of these wastes, a suitable facility of disposal is required.
- An independent body responsible only for durable nuclear wastes should be founded.
- Integrated waste management plans to be included into fuel cycles.

If I may say, the humanity is still like a toddler when it comes to nuclear power. We learnt how to produce energy from it but we do not know how to clean up after ourselves for the time being. Relatively cheap and clean electricity comes with a gigantic "what if?" every single time we consider switching to nuclear energy.

Billions and billions of dollars need to be spent on nuclear waste containment and disposal. Doing nothing about them would, in the end, cost the whole thing.

REFERENCES

1. Akkuyu project receives production licence, http://www.world-nuclear-news.org/NN-Akkuyu-project-receives-production-licence-16061701.html, retrieved on 15.6.2017.
2. Alvarez, R., Fixing America's Nuclear Waste Storage Problem, June 20, 2011, https://www.thenation.com/article/fixing-americas-nuclear-waste-storage-problem/, retrieved on 11.6.2017.
3. Emergency declared at US Hanford nuclear waste site after tunnel collapse, https://www.rt.com/usa/387760-hanford-tunnel-collapse-nuclear/, retrieved on 21.6.2017.
4. High cost of nuclear waste, http://www.dailymail.co.uk/news/article-126360/High-cost-nuclear-waste.html, retrieved on 11.6.2017.
5. How much depleted uranium hexafluoride is stored in the United States?, http://web.ead.anl.gov/uranium/faq/storage/faq16.cfm, retrieved on 15.6.2017.
6. IAEA notes upgrades to Turkish research reactor, http://www.world-nuclear-news.org/RS-

IAEA-notes-upgrades-to-Turkish-research-reactor-11051701.html, retrieved on 15.6.2017.

7. IEA finds CO_2 emissions flat for third straight year even as global economy grew in 2016, 17 March 2017, http://www.iea.org/newsroom/news/2017/march/iea-finds-co2-emissions-flat-for-third-straight-year-even-as-global-economy-grew.html, retrieved on 21.4.2017.

8. Jewell, J., Ready for nuclear energy?: An assessment of capacities and motivations for launching new national nuclear power programs, Energy Policy 39 (2011) 1041–1055.

9. Nuclear Power in Turkey, http://www.world-nuclear.org/information-library/country-profiles/countries-t-z/turkey.aspx, retrieved on 21.6.2017.

10. Nuclear Power Program and NPP Projects in Turkey Nuclear Energy Project Implementation Department Report No: 2, March 2013, Turkish Ministry of Energy and Natural Resources.

11. Nuclear power, http://www.ucsusa.org/nuclear-power/nuclear-waste, retrieved on 15.6.2017.

12. Piper, G., Internationaler Uranhexafluorid-Tourismus durch Deutschland, https://www.heise.de/tp/features/Internationaler-Uranhexafluorid-Tourismus-durch-Deutschland-3414168.html, retrieved on 15.6.2017.

13. Radioactive Waste Management, June 2017, http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/radioactive-waste-management.aspx, retrieved on 11.6.2017.

14. Reprocessing and Nuclear Waste, http://www.ucsusa.org/nuclear-weapons/nuclear-terrorism/reprocessing-nuclear-waste, retrieved on 15.6.2017.

15. Russel, R., Nuclear waste: Planning for the next million years, May 4, 2017, http://www.theglobaldispatches.com/articles/nuclear-waste-planning-for-the-next-million-years, retrieved on 15.6.2017.

16. Safer Storage of Spent Nuclear Fuel, http://www.ucsusa.org/nuclear-power/nuclear-waste/safer-storage-of-spent-fuel, retrieved on 21.6.2017.

17. Seibert, J., Nuclear Waste, http://global-waste.de/nuclear-waste.html, retrieved on 15.6.2017.

18. Storage and Disposal of Radioactive Wastes, May 2017, http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/storage-and-disposal-of-radioactive-wastes.aspx, retrieved on 11.6.2017.

19. The Elusive Permanent Repository, http://www.ucsusa.org/nuclear-power/nuclear-waste/permanent-waste-repository, retrieved on 15.6.2017.

20. The Future of the Nuclear Fuel Cycle, 2011, MIT Study on The Future of Nuclear Fuel Cycle, Chapter 5.

21. What are nuclear wastes and how are they managed?, http://www.world-nuclear.org/nuclear-basics/what-are-nuclear-wastes.aspx, retrieved on 15.6.2017.

22. What Does the U.S. Do with Nuclear Waste?, https://www.scientificamerican.com/article/what-does-the-us-do-with-nuclear-waste/, retrieved on 11.6.2017.

AKKUYU NUCLEAR POWER PLANT COST & BENEFIT ANALYSIS

Sezayi TOPRAK & Selman DAL

Introduction to Akkuyu Nuclear Power Plant

Turkey is in need of finding a sustainable source for electricity production due to an increasing demand and consumption for electricity. The country has a huge current account deficit most of which results from its energy imports. Plans for nuclear power construction are a key aspect of the country's aim for sustainable economic growth. In Turkey, building up a nuclear power plant has always been a hot topic for discussion at least for 40 years. Turkey has had plans for establishing nuclear power generation since 1970. Today an application has been made for construction and operating licenses for the first plant at Akkuyu.

Turkey's electricity production was 240 billion kilowatt hours (kWh) or 240 Terawatt hours, gross from 53 gigawatts electrical capacity (GWe) in 2012. Of this, 105 150 Terawatt hours (TWh) (44%) came from gas (two thirds of this from Russia, most of the rest from Iran), 68 TWh (28%) from coal, and 58 TWh (24%) from hydro. In 2015, the percentage of electricity produced by gas decreased to 40%, which is still high. Net import was 3 TWh. Demand growth is about 8% pa, and in the first half of 2012 consumption was 119.3 billion kWh. Per capita consumption has risen from 800 kWh/yr in 1990 to about 2700 kWh/yr in 2011. Demand in 2023 is expected to be about 450 billion kWh, implying new investments by then of $100 billion. (World Nuclear Association, 2014)

Plans for nuclear power are a key aspect of the country's aim for economic growth, and it aims to cut back its vulnerable reliance on Russian and Iranian gas for electricity. The Ministry of Energy and Natural Resources (ETKB) projects 2020 electricity production as possibly 499 TWh in a high scenario of 8% growth, or 406 TWh with a low scenario of 6.1% growth. Plans are to have 30 gigawatts of coal fired electrical capacity by 2023. However, much of the country's coal resources are lignite with low calorific value – less than 12.5 MJ/kg, and a substantial amount (Afsin Ebistan) at less than 5 MJ/kg. (World Nuclear Association, 2014)

The Akkuyu nuclear project has an estimated investment cost of about US$ 20 Billion. Akkuyu plant will have four 1200 MWe AES-2006 units. The plant is estimated to be paid off in 15 years. It is planned to be operational in 2018.

Identification of Costs and Monetization

Pre-Investment Costs

Pre-development costs are the expenditure before the building phase of a nuclear power plant. They include research and development of the plant site, setting up necessary governmental bodies and streamlining the law. These costs will be mostly incurred by the government. Expenditures that had already been incurred amounted to $33.2 million (including operational costs of the Turkish Atomic Agency (TAEK), research and core activities, grants for investment in construction and assembly, power plant and nuclear waste location analyses). (Akkuyu Nuclear, 2016)

Construction Costs

Capital costs are incurred while the plant is under construction and consist of expenditure on the necessary equipment, engineering and labor. They are often presented as overnight costs, i.e. exclusive of interest accruing during the construction period, and include engineer-procure-construct costs, owners' costs and various contingencies. Once the plant is completed and electricity sales begin, the plant owners begin to repay the sum of overnight costs and accrued interest charges.

Building a NPP is a long and costly process and it has enormous up-front cost. Reactors are extremely expensive to build and future income is unpredictable because of the deregulated electricity market. Construction costs of third-generation reactors amount to $3.2 million per MW of capacity built. This means that the construction of four 1200 MWe units with a total capacity of 4800 MWe would cost $15.36 billion (4800MWe*$3.2million). (IEA, 2005)

In this project, it was assumed that these expenditures consist of overnight costs and capital institutions' interest costs. Regarding the volume of expenditure incurred year, we assume that the construction costs are incurred within the first 2 years.

Operating Costs

Nuclear power plants have lower fuel costs but higher operating and maintenance costs than coal power plants. Operations and maintenance (O&M) costs are very variable for NPPs, depending on such factors as plant size and age, but on average they account for 20% of the total costs per year, Deregulation of electricity markets has helped in introducing best practices in reducing O&M costs throughout the industry, while maintaining or improving high safety standards. (World Nuclear Association, 2014)

Fuel

The supply of nuclear fuel, that is uranium, for the NPP planned in Akkuyu will come from imports. Two-thirds of the supply of uranium globally come from primary sources or from mines in Canada, Australia, Kazakhstan and Niger. Security of supply of nuclear fuel depends on the certainty of supply of uranium ore and concentrate uranium,

access to fuel cycle services, as well as a reliable and secure transport of finished nuclear fuel.

Turkey at the beginning will not produce the fuel, but buy it from one of the several global fuel suppliers. (Akkuyu Nuclear, 2016) Purchase of fuel will be bound, at least in the first phase operation of NPP, with the purchase of technology. The world practice is that the technology provider also provides the fuel supply for the first 5-10 years operation.

The only significant economic use of naturally occurring uranium is to use it to produce nuclear fuel necessary in nuclear reactors. It has such large amounts of energy that the annual operating NPP with a capacity of 1000 MWe needs only about 25 tons of nuclear fuel a year, so 120 tons (4.8*25) are necessary for a NPP of 4800 MWe capacity. The costs of fuel are low and relatively stable. The Ux Consulting Company publishes daily price for uranium (The Ux Consulting Company, 2016).

In November 2016, the approximate cost to obtain 1 kg uranium as nuclear reactor fuel (at current long-term uranium price): (World Nuclear Association, 2016)

Table 1. Approximate Costs to Get 1 Kg Uranium as Nuclear Reactor Fuel

Uranium	8.9 kg U_3O_8 x $97	$ 862
Conversion	7.5 kg U x $16	$ 120
Enrichment	7.3 Separative Work Units (SWU) x $82	$ 599
Fuel fabrication	per kg (approx)	$ 300
Total, approx.		**$ 1880**

The Cost of fuel per MWh is about $5.22 (1 kg fuel yields approximately 360MWh. So $1,880/360MWh = $5.22/MWh). If one assumes that the plant would produce approximately 37.8 million MWh per year (4800 MW capacity*90% operational performance*24 hours*365 days), then the annual cost of fuel would be $198 million.

Waste

The regulations controlling nuclear power industry typically require the plant operator to make a provision for disposing of any waste, thus these costs are internalized (World Nuclear Association, 2016). It has been assumed that high-radioactive waste and spent fuel disposal costs around $1/MWh (Kennedy, 2007), resulting in the annual cost of waste for a 4800 MW NPP to be around $38 million (37,843,200 MWh*$1) per year.

Management and Labor

In this analyses average management and labor cost are estimated at $10/MWh (Kennedy). Thus, annual management and labor cost would be about $378 million (37.8 million MWh*$10).

Decommissioning Costs

At the end of a NPP's lifetime the plant must be decommissioned. This process begins immediately after final and permanent closure and continues ideally to the point of leaving a clear site where the facility had once stood. It incorporates some or all of the following activities: the safe management of nuclear materials held in the facility as well as radioactive and other wastes, decontamination, plant dismantling, demolition and site remediation. This entails dismantling, safe storage or entombment.

Operators are usually required to build up a fund to cover these costs while the plant is operating to limit the financial risk from operator bankruptcy. Provision for decommissioning costs is made by making financial contributions over the economic life of the plant towards plant dismantling and eventual site restoration. Given that plants are expected to have long lives, the contributions are not significant. The World Nuclear Association (2005) states that they amount to less than 1% of the overall costs per year (1 % of overall operating costs is about $6.1 million). It is required for the plant owners to set aside money when the plant is still operating to pay for the future shutdown costs (World Nuclear Association, 2005)

Identification of Benefits and Monetization

Lower Energy Cost

For the last decades, electricity demand in Turkey has been growing at a significant rate. It almost reached an annual increase of 6.5%. (TEIAS, 2016) As mentioned, Turkish electricity production rests on hydropower and fossil-fueled thermal power generation. Regarding the shares, almost 40% of the total has been produced by using natural gas in 2015. In our estimations, we referred to unit costs of production factors i.e. natural gas and nuclear power. Based on International Energy Agency (IEA) data, unit cost of electricity production with natural gas ranges between 0.086 $/KWh and 0.092 $/KWh and unit cost of production by using nuclear power plants (NPP) ranges between 0.059 $/KWh and 0.099 $/KWh.

In our analysis, we used average value of both these amounts. Obviously, NPP has a 0.01 $/KWh cost advantage compared to natural gas. Given the total capacity of 4,800 MWh and the 90% capacity utilization ratio, net present value of reduced energy cost reaches $ 6 billion which is a great contribution to Turkish economy.

Carbon Emission Reduction

One of the most significant benefits of NPP to Turkey will be the reduction in the carbon emission. Based on IEA data, the annual carbon emission reduction from operation of 1000 MWh of NPP is approximately 2.5 million tons of CO_2 which means 700,000 tons of carbon annually, compared to gas-powered electricity production (DTI, 2016). In our case, Akkuyu NPP will have 4,800 MWh total capacity, with a 90% capacity utilization. Based on these data, valuing emissions savings at a carbon tax of $30/ton gives

us a present value of $772 million approximately.

Employment Benefits

In Turkey, the unemployment rate is almost 10% and for the last decade, government has been trying to decrease this amount to reasonable rates. Even though there has been great progress on that front, unemployment stays high due to both cyclical and structural factors such as low capacity of industrial and business sector. Based on Bloomberg HT data, Akkuyu NPP will provide 10,000 jobs during the construction and 3,500 jobs after the construction with employment. Based on expert views on both sectors, we assume that 20% of the workers employed during the construction and 80% of the workers employed after the construction are skilled. Based on wage data by related institutions[1], $ 3.8 billion net present value is estimated from additional employment contribution of Akkuyu NPP. In this estimation, wage increases were also considered for the upcoming years.

Reduced Natural Gas Imported

As mentioned, Turkey`s energy production very much depends on fossil fuels, specifically natural gas which is one of the most significant factors behind the current account deficit of the country. Turkey`s total natural gas import cost reached $ 22 billion in 2015 and expected to reach $ 25 billion in 2018. (TEIAS, 2016) Within the context of "Strategic Energy Plan" by Ministry of Energy, it is planned to substitute electricity production by NPP with natural gas production and thus decrease natural gas imports to achieve more sustainable current accounts. In that context, it is anticipated that the share of the natural gas in electricity production will decrease by 5percentage points (from 40% to 35%). (Enerji ve Tabi Kaynaklar Bakanligi, 2014) Valuing this reduction in our estimations gives us a NPV of $50 billion in 30 years approximately which is a great benefit for the country.

Net Present Value of the Project

To calculate the NPV of the project, the total discounted costs were subtracted from the total discounted benefits. The inflation-adjusted discount rate (DR) applied is 10%. After the discounting, the NPV for 30 years of this project is roughly $40.3 billion, and the benefit cost ratio is 2.98. If the minimal usage time of the NPP is decreased from 30 to 20 years only, the NPV is still positive at $26.6 billion.

1 Bloomberg HT, Turkish Statistical Institute and Turkish Atomic Energy Authority

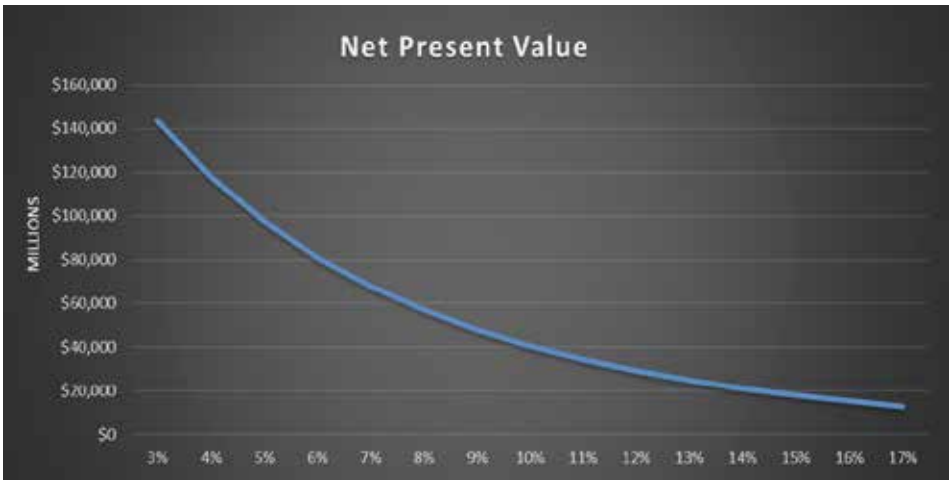
Table 2. Cost Benefit Analysis Summary

Cost Benefit Analysis (as of 2016)			
Costs	**NPV**	**Benefits**	**NPV**
Pre-investment Costs	$33,210,601.60	Lower Energy Cost	$5,981,023,214.17
Construction Costs	$13,963,636,363.64	Carbon Emission Reduction (Net)	$772,736,953.17
Operating Cost	$6,194,329,879.67	Total Employment Benefits	$3,732,227,080.95
Decommissioning Costs	$147,113,094.35	Reduced Amount of Natural Gas Imported(2018	$50,114,772,839.69
Total Cost	**$20,338,289,939**	**Total Revenues**	**$60,600,760,088**
NPV (20 years)	**$26,557,374,224**		**BCR**
NPV (30 years)	**$40,262,470,149**		**2.98**

Sensitivity Analysis

Only the discount rate has been included in this study as a sensitive parameter. This study is based on 10% discount rate (DR). For the DR sensitivity analysis, a range between 3% and 17% is applied. The NPV decreases when the DR increases since the highest benefits (reduced natural gas imported, employment benefits) are mostly in the future and thus receive lesser weight at a higher discount rate, whereas construction cost is incurred in 2016 and 2017. Nevertheless, NPV remains high even for a DR of 17%, where even in this worst-case scenario the NPV would be still positive (See Figure 1).

Figure 1. Sensitivity Analysis of the Project



Conclusion

This study shows a cost-benefit analysis of the Akkuyu Nuclear Power Plant in overall. The main benefits are as follows: i) reduced cost of energy production, ii) lower carbon

emission, iii) additional amount of employment, iv) reduced natural gas imported. The NPV of this analysis is around $40.3 billion from a 30-year perspective.

This analysis shows that at this point the project seems to be quite sensible from the view of the cost and benefit analysis, since its NPV as well as cost-benefit ratio are positive, even with conservative assumptions. Moreover, as the sensitivity analyses show, the project is so solid that it could withstand a significant increase in DR and still have a solid NPV.

Bibliography

Akkuyu Nuclear. (2016, November 25). Akkuyu Nuclear. Retrieved from Akkuyu Nuclear: http://www.akkunpp.com/

DTI. (2016). Cost Benefit Analysis of Nuclear Power. Webarchive.

Economist. (2016). Wind and Solar Power are even more expensive .

Enerji ve Tabi Kaynaklar Bakanligi. (2014). 2015-2019 Stratejik Plan. Ankara: Enerji ve Tabi Kaynaklar Bakanligi.

IEA. (2005). Projected Costs of Generating Electricity. Paris: OECD.

International Energy Agency. (2016, 12 4).

Kennedy, D. (2007). New Nuclear Power Generation In The UK: Cost Benefit Analysis. London: Department of Trade and Industry.

Namli, H. T., & Namli, S. (2014). Nuclear Power In Turkey: Pros And Cons. The 2014 WEI International Academic Conference. New Orleans.

TEIAS. (2016, 12 4). TEIAS. Retrieved from http://www.teias.gov.tr/Eng/Default.aspx

The Ux Consulting Company. (2016, November 27). The Ux Consulting Company. Retrieved from The Ux Consulting Company: http://www.uxc.com

World Nuclear Association. (2005). The New Economics of Nuclear Power. London: WNA.

World Nuclear Association. (2014). Nuclear Power in Turkey. WNA.

World Nuclear Association. (2016, November 25). The Economics of Nuclear Power. Retrieved from World Nuclear Association: http://www.world-nuclear.org/information-library/economic-aspects/economics-of-nuclear-power.aspx

FROM THE FIRST AND ONLY CIVIL ORGANIZATION FOCUSED ON ENERGY POLICIES: TESPAM

"from a country as being a follower of the international energy policies agenda to the ideal of making Turkey an agenda-setter country"

Energy Policy Turkey

NEW TURKEY:
ONE-STEP FORWARD TO INTERNATIONAL POLICY MAKING

Contact Information
Phone: +90 312 999 38 18
E-mail: info@tespam.org
Web: www.energypolicyturkey.com
Address: Nasuh Akar M. 1403 S. No:8-4 Balgat-Çankaya /Ankara

TESPAM