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Discussion Paper Series

The Economics and Prospects of Energy Development and Cooperation in the Levant Including the Cyprus Exclusive Economic Zone

Charles Ellinas

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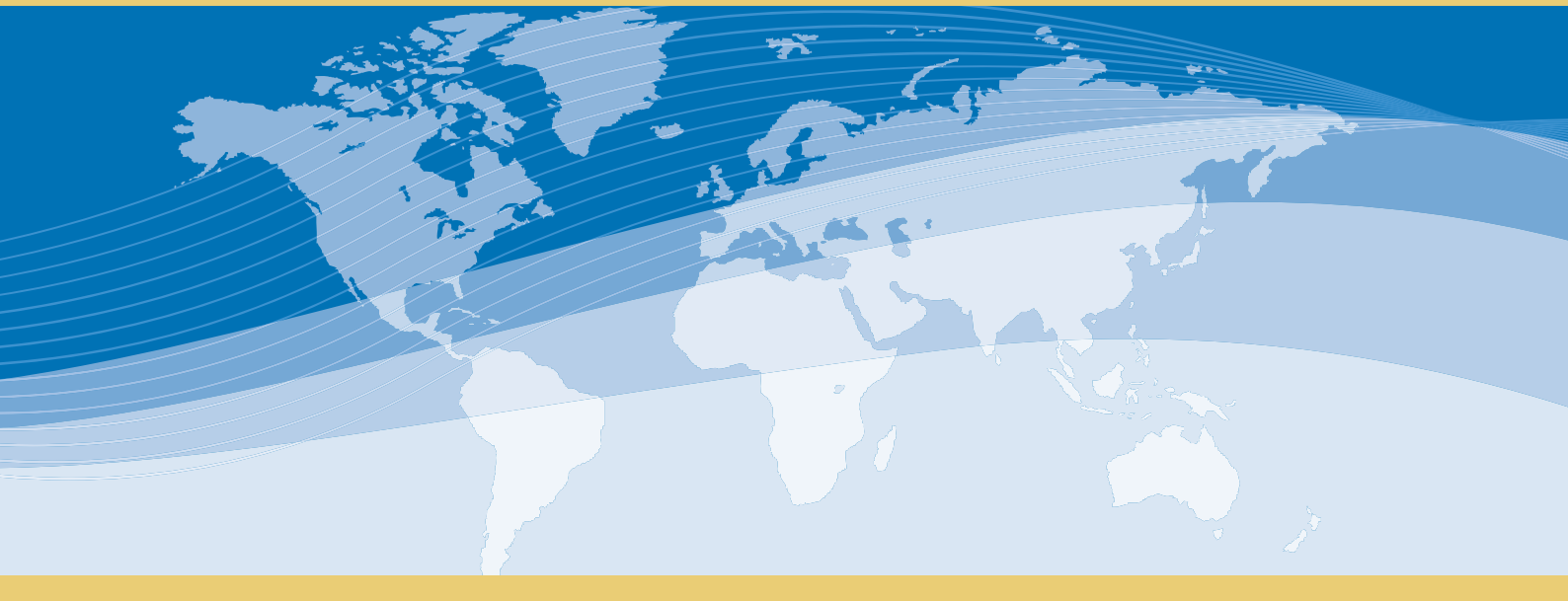

CYPRUS ECONOMIC SOCIETY DISCUSSION PAPER SERIES

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The Economics and Prospects of Energy Development and Cooperation in the Levant Including the Cyprus Exclusive Economic Zone*

Charles Ellinas**

CES Discussion Paper Series No. 4

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* The paper is an edited version of a talk given to a Discussion Forum organised by the Cyprus Economic Society, in Nicosia on May 16, 2017.

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Abstract

This paper is an edited version of a Discussion Forum organised by the Cyprus Economic Society in May 2017. References in the main text to events that have now come to pass have not been altered. The paper, and the presentation it is based on, covers the dynamics of global energy markets, the long-term outlook for prices and the energy mix, the East Med discoveries and the regional players and markets, and export options.

Global energy markets are going through a structural change, driven by abundance in oil and gas resources on the supply side and a transition to low carbon energy on the demand side as countries seek to implement policies for climate change. According to the BP Energy Outlook which outlines the likely path of energy markets until 2035, the energy mix will be changing in favour of renewables overall, in favour of gas over oil, and in favour of LNG over pipelines regarding the transport of gas. The net result is a permanent shift in pricing dynamics to considerably lower prices. In addition, not all of the oil and gas reserves discovered thus far will be consumed in the future. Competition for market share will hence ensure that prices stay low for a very long time. Global demand for energy will be rising by an average of 1,3% annually according to BP. This will be driven mostly by developing countries whilst demand in the OECD countries, including Europe, will barely grow. However, the depletion of indigenous resources of gas in Europe means that imports will be growing. Russia's Gazprom is the lowest cost producer with huge reserves and considerable spare capacity. It, therefore, is in a position to defend and increase its market share in Europe.

East Med gas must be developed at competitive prices and secure export markets within the prevailing low price environment if it is to succeed. So pipeline options are not going to happen. This is the main reason why Leviathan and Aphrodite have so far failed to secure export markets. Prospects for selling to Europe are very limited. In the longer term, FNLG may become an option for gas exports to Asian markets. A key element in this regard is collaboration between the companies to keep development costs down. Only integrated projects can limit development and production costs.

Key words: oil and gas, East Med, global energy markets, EEZ, FLNG, Gazprom, Cyprus, Israel, Egypt, Turkey, low carbon energy

JEL Classification: Q27, Q31, Q34, Q41, Q47

1. Introduction and overview

When I was asked to make a presentation to the Cyprus Economic Society, I was told my audience would be people who understand numbers. So I am going to give you a lot of numbers. I will try to make as complete a presentation as possible, covering everything the title includes not just Cyprus but also the world and the region, including what is happening in Israel, in Egypt, and in Turkey, and how what is happening in these countries and the region generally, affect Cyprus.

Let me start with an overview of my presentation. I will first talk about what is happening globally, especially the outlook to 2035 by British Petroleum (BP) and how it will affect us. I will then talk about the abundance of oil and gas resources in the world; about the growth in gas demand worldwide and the impact of gas and Gazprom in Europe, which also affect us in a big way. I will also talk about Cyprus and Israel; and about the regional markets in Egypt and Turkey. I will then turn to East Med export options and the implications for East Med gas. I will end with some conclusions.

There are two issues that don't receive much attention and yet these are paramount to the way oil and gas works. The first of these issues is global markets and prices. The second is the environment and what it means for global energy.

Global markets and prices are important. Most seem to think that it suffices to find gas in our Exclusive Economic Zone (EEZ), develop those fields and that after that somebody will buy it. It doesn't work that way. Before you do anything with the discovered gas, and before banks will lend you any money, you will need to find buyers. This is a hard reality that seems to elude us. It appears to be very difficult for people to understand this and so we end up getting bogged down with designing pipelines and other infrastructure before we have sold anything at all.

Global climate change and environmental issues are also critical. The world is going green. The global response to the environment is having a significant impact on the global energy mix, the growth of renewables and the development of technologies for a greener environment. The more green the world becomes the less oil and gas the world will need to consume.

These two issues, the challenge of low oil and gas prices and the impact of renewables, affect the whole world and affect us also. Gas is not a local issue. It is

a global issue and we have to think and act within this context of global factors and markets.

The world is going through a major permanent transition from high carbon to low carbon energy. This means that not all discovered fossil-fuels and energy resources will be consumed in the future. Quite a lot of oil and a lot of gas will stay where it is and it will not be consumed. The other issue is that there is too much oil and too much gas in the market. If you have too much of anything, prices go down and stay down, and this is where we are stuck at the moment in energy markets. This is a major factor affecting export prospects of natural gas from our region which, though, is so often ignored.

Global energy markets are undergoing a permanent structural change. If you go back say 20 years, prices were cyclic, going down and coming up again and down, and up. Today this is no longer the case. Prices are going down and staying down. There is no coming up anymore in any significant and sustainable way. The structural change I am talking about is the transition to low carbon energy and its impact on global prices.

The Paris climate agreement is impacting global energy markets. The Paris agreement has set as a goal to limit global temperature increase to less than 2 degrees centigrade by 2100. This may seem too far away into the future for us to worry at present, but in order to achieve that goal, targets must be set from now. These targets affect us all and affect global energy markets also. In Europe for example, the target is to have 20% less carbon emissions by 2020 and 30% less by 2030. In addition, by 2030 renewables should provide 27% of Europe's primary energy. In effect, this means 27% less fossil-fuels. Europe will likely raise these targets and, in the end, it all means using less oil and gas.

President Trump of the United States is a doubter. He doesn't believe in climate change so he is going to have an impact in the opposite direction; that also needs to be factored in. However, this will not change the fundamental reality that there is a glut of oil and gas in global markets which have led to lower prices. If anything, his policies of unleashing more shale oil and gas to an already over-supplied world will impact prices even more.

In the East Med region, as far as Israel is concerned, a Final Investment Decision (FID) has been declared for Phase 1A of Leviathan. An FID is a point of no return. Without an FID nothing happens. So Israel has declared an FID for Phase 1A of

Leviathan. This is good news for Israel but it is for the domestic market and Jordan only. At the same time Cyprus' third licensing round was concluded successfully and drilling is part of it.

However, Cyprus and Israel need to find international buyers for their gas. Export options are becoming a challenge and I will talk about this later. Israel and Lebanon have kicked off their first licensing rounds but the response is limited. Egypt and Turkey are possible markets and given their importance in the region, I also will talk about them in more detail later on.

2. East Med gas finds

In relation to East Med gas there is an increase in the number of offshore discoveries in Egypt. It is not just big discoveries like Zohr. There is relatively large number of small discoveries, and I will talk about them when I talk about Egypt.

Prospects for Cyprus look good. French energy company Total is about to start drilling in Block 11 in July. I believe this is actually going to happen and will not be postponed. Total has already placed the contracts and it is already spending money on this project. It cannot stop unless the government comes and tells them to stop.

Indications about block 11 are good and point to a discovery similar to Aphrodite's. It may not be large but the importance of it is that, if there is a discovery, it would be in a carbonate formation, which is a similar geological formation where Zohr has been found. In this case it will confirm the Zohr model and if it does then the prospects for block 10 where ExxonMobil is, will improve. Block 10 is looking at similar carbonate formations and this is where the bigger prospect is. Of course until a discovery is made nothing is guaranteed as the experience in Block 9 indicates where nothing was found.

The Italian energy company ENI will follow with drilling in blocks 2, 3 and 9 in November because their license expires in February 2018. However, the chances for discoveries in these blocks are lower. The kind of potential gas fields that exist in these blocs are in sandstone formations, similar to Aphrodite and the ones that ENI drilled in Block 9 unsuccessfully.

ExxonMobil is planning to drill in the second half of 2018 in block 10 which holds the best prospect for a significant discovery.

Going back to Total in block 11, if they will be successful one of the options they will consider for exporting the gas finds is by Floating LNG (FLNG). I mention this because I will talk about it later on in some detail.

Just to make a simple explanation about gas fields, Aphrodite is like a dome. So the structure is such that the gas rises and it is trapped in a dome on the top. That is a type of formation that has better chances to contain gas. In blocks 2, 3 and 9 you have strata that meet each other at an angle. Gas can be trapped here but you need to have a good seal where the strata meet, which is often not the case and the gas escapes. So this is where the danger is for Blocks 2, 3 and 9.

Any drilling in Lebanon and Israel will be delayed. Their licensing rounds are not going very fast and expressed interest to participate is not very strong. We need to wait and see what happens.

The East Med major gas fields are Tamar and Leviathan in Israel, Zohr in the Egyptian zone and Aphrodite. These are the gas fields that have excited interest in the area, and that's why ExxonMobil came here.

2.1 Port support services

Before I go on to talk about the big issues, let's talk about the small issues first, like port support services.

Hydrocarbon exploration requires access to ports for support services. You are all aware of what happened in Larnaca. There was a debacle that was quite a disaster for us. The oil companies come here, they put their faith in us, they put their investment in Cyprus to explore for gas at their risk, that if successful we would benefit out of it. What did we do? We chuck them out. This is not a small issue. They have been given a temporary base in Limassol. I call it a temporary base because I am not entirely sure about what is happening in Limassol.

Total is going to support their drilling from Limassol and it is possible that ExxonMobil will do the same. I think ENI may still carry on its work from Larnaca by taking mud operations on ship, which is not the best way to go about it but they have to bend backwards to avoid problems.

We need to find a longer term solution. One or two months ago, I interviewed the Minister of Communications and Works, Marios Demetriades, for a natural gas journal. He told me that they have a master plan, and that they are in the process of purchasing land at Vasilikos in order to convert it into a longer term port. We need to do that. We need to support the oil and gas companies. We had Noble that so far has been nice and accommodating, but I assure you that when ExxonMobil starts they will be very demanding. They are a very big company, they have a very discipline and rigid way of doing things, and we will need to be able to respond to their requirements and timely.

The production sharing agreements we have with these companies are very favourable for us. For every □3 profit we get □2 and the oil company gets □1. Helping these companies to produce and export will also be to our significant benefit.

Sometimes we are short sighted in the way we look at things. I looked at the issues in Larnaca and believe me there was a lot of activism and little about reality. The oil companies are doing a very sensible and very responsible drilling. The ports are needed as a place to store equipment and take them offshore to support drilling. There is hardly anything that happens at the port that is going to affect anybody and yet big issues came out of it. In Larnaca there were cars going along

the highway calling it the radioactivity highway. These are things we need to resolve. But the oil companies may resolve them for us. They can produce everything offshore without bringing anything onshore.

I call this community collaboration even though it is a little bit different than what the title implies.

2.2 Turkey's reactions

First of all because Total is going to do drilling in July we are having the customary response from Turkey. Right now we tend to ignore and dismiss what Turkey may do. We always ignore why Turkey is doing what is doing, what is driving Turkey to be aggressive and be difficult with us. We don't look at it from the Turkish point of view but we must because it has actually serious implications.

There are two reasons why Turkey is intervening. First, it sees its role to safeguard the interests of the Turkish Cypriots. Sometimes we say this is an excuse because they want to get their hands on our natural gas. In my opinion that is not a driving factor. Turkey does not need our gas. I will say more about it later. They mean it when they say they want to safeguard the interests of the Turkish Cypriots. They are doing something similar for Palestine even as they are trying to mend fences with Israel. Turkey's President Tayyip Erdogan feels strongly about supporting the Palestinians. He sees the role of Turkey as a strong Muslim power to protect a weak Muslim nation, Palestine, needing its support.

The second and more critical issue is the fact that Turkey hasn't declared an EEZ. Turkey is claiming that islands are not entitled to exclusive economic zones. The continental shelves of the mainlands like Turkey and Greece are entitled to an EEZ but not the islands. These issues also affect the Aegean. That is why there is a continuous problem between Greece and Turkey in the Aegean. Accordingly Turkey claims half of the Aegean as far as oil and gas are concerned. I am not talking about sovereignty, but ownership of resources in the Aegean.

Turkey's position is that the same principle applies to Cyprus so they say that a part of each of the blocks 1, 4, 5, 6 and 7 belong to them. Obviously we don't agree with that. We have delineated our EEZ and declared it, and agreed boundaries with Egypt, Israel and Lebanon based on the United Nations law of the seas, UNCLOS. We believe strongly that we are on the right side of things and that the

EEZ belongs to us. Turkey is not party to this UN agreement, it has not recognized it and it claims it is not bound by it.

They are using different arguments and I must tell you these arguments have been used in one or two occasions in other parts of the world successfully. So Turkey feels it has a case and that is why it is becoming so difficult. But Cyprus is not just an island; it is also a state and has full rights to its EEZ.

So if Turkey is claiming a part of Cyprus' EEZ and they have similar claims in the Aegean, you can imagine if we go and drill in areas Turkey claims as part of its continental shelf and they do nothing is like telling the world, they don't mind anymore. They do mind about the Aegean and they do mind about Cyprus also.

The reason I am saying this is important is that, even if there is a solution to the Cyprus problem it will only sort out the Turkish Cypriot side of the story and their claims, but it will not sort out this part of the story. Turkey will still be claiming part of our EEZ and it would stay as a problem even after a solution of the Cyprus problem. It has to be a comprehensive solution between Turkey and Greece before our issue can be settled.

Turkish Cypriots want us to stop drilling until a solution to the Cyprus problem is found. But this is not good for Cyprus for the reasons I explained before. If we stop and wait for years, the markets are going further away from us. And I would talk about markets later on.

Christofias and Talat had agreed on a method to divide the future benefits between the two communities. In a context of a solution to the Cyprus problem, hydrocarbon resources will be developed by the Federal Government. For me that safeguards the interests of the Turkish Cypriots. In my opinion then the Cyprus government and the oil and gas companies must proceed with current plans to complete drilling and leave the issues with Turkey to be settled separately politically. Negotiations must also carry on.

3. BP Global Energy Outlook until 2035

We talked about all the local problems now let's talk about the world. Every year BP produces what it calls an energy outlook where they look at what is going to happen in global energy over the next 20 years. Something similar is done by

other companies and organisations also, including by ExxonMobil. All their projections however, are broadly similar.

So first of all, BP says that global energy demand will rise by 30% between 2015 and 2035 and it will be driven by developing countries mostly in Asia. On an annual basis, however, that growth is going to be very small, about 1,3%. Primary energy demand within the OECD countries such as in Europe will barely grow. They expect growth of energy demand in Europe to be less than 0,5% per year. Economic activity in Europe will be rising but energy demand will not. This will be due to increases in renewables and in energy efficiency which will be offsetting the growth of energy demand.

A permanent energy transition is under way, as I said before, driven by technological improvements, renewables and environmental concerns. More than half the growth in the consumption of energy will be from non-fossil fuels. That is, renewables, nuclear and hydro will provide more than half of the future growing energy needs of the world. Renewables are actually the fastest growing energy source expected to quadruple by 2035.

Gas consumption will grow faster than oil and coal with 50% exported as LNG, which is good news for us. That means that gas will continue to be needed in the future. So if we are looking to exploit our gas resources then that is good news.

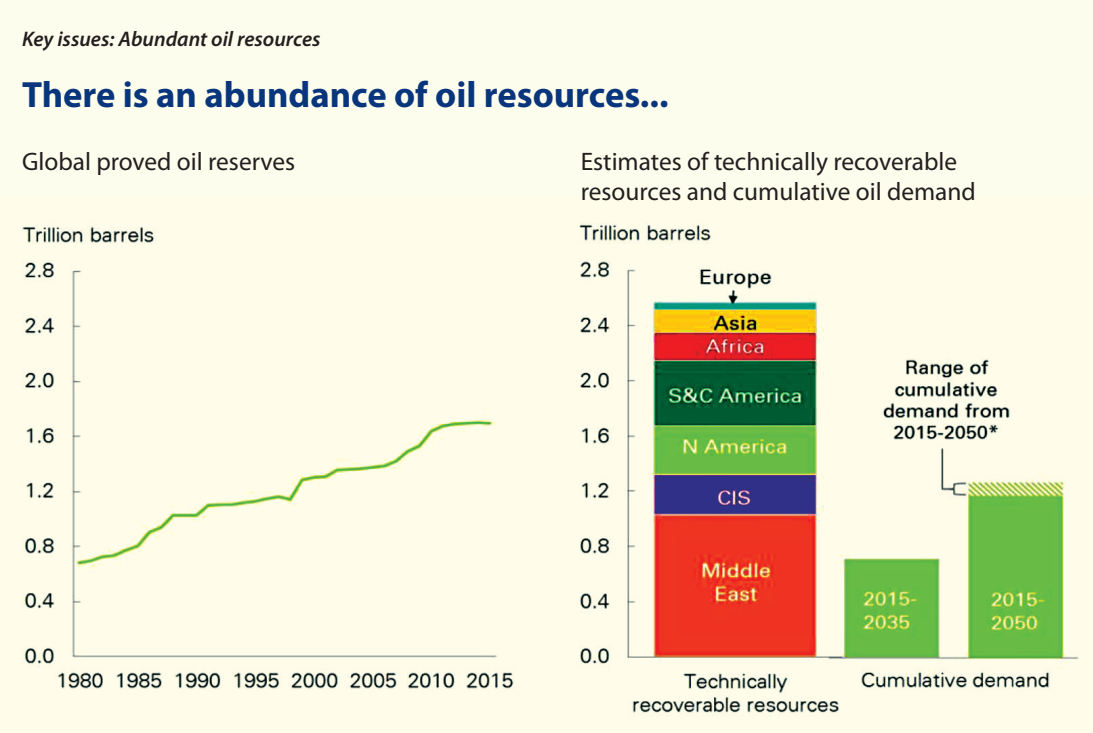
BP's key conclusion is that a major and permanent energy transition is under way, the global energy landscape is changing and the energy mix is shifting towards cleaner alternatives. The good news as I said before is that gas consumption will continue even as renewables grow.

3.1 Abundance of oil and gas resources

Now let's look at what I call the abundance of technically recoverable oil and gas resources. There is also a lot more of oil and gas in the world that is not technically recoverable, yet. Technically recoverable oil resources in the world at present are estimated at 2,6 trillion barrels. According to BP's energy outlook, as a result of the slowing down of the growth in oil demand less than half of it would be used. About 1,25 trillion barrels will be consumed by 2050. That means that the rest of it, 1,35 trillion barrels of oil will stay where it is. So in other words there is too much oil and prices will stay low as a result.

Sheikh Zaki Yamani, a Saudi Arabian who served as his country's oil inister in the 1970s, said in 2003 something very prophetic. He said, "The stone-age did not end for lack of stones and the oil age will end long before the world runs out of oil". This is exactly what is happening.

Similar arguments apply to natural gas. The International Energy Agency estimates that at the end of 2014 the total remaining technically recoverable gas resources were about 781 trillion m3. Of this, according to BP's outlook, only 155 trillion m3 will be consumed between now and 2050. Again there is too much gas. So the world is facing a long term oil and gas glut. This continuous oversupply of oil and gas means low prices for longer. It also means that a lot of oil and gas is going to stay where it is, in the ground.



3.2 Growth in global gas demand

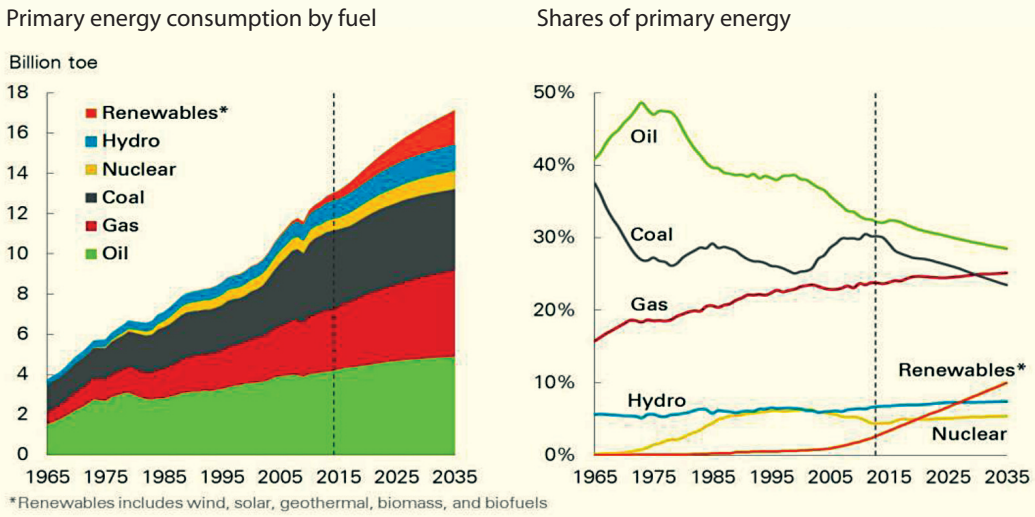
As already said, gas is expected to overtake coal as the primary source of energy in the world economy by 2030. But net growth will be slow. Two thirds of the increase in gas supplies will come from shale gas. A lot of it will come from North America. The share of gas imports to Europe will rise for about 50% in 2015 to more than 80% in 2035 because Europe is running out of its own gas and it will have to import more and more of it.

That might seem like opening up opportunities for us, but sadly it doesn't and I will explain the reasons later on why it doesn't. Russia will provide most of that additional gas and will also support its market share against competition. So they can control price and I will tell you how far they can go to in controlling price.

LNG supplies will grow rapidly to account for about half the globally traded gas by 2035. The global markets in gas will become more integrated. The outcome will be that with a glut of gas and Russia determined to defend its markets, prices in Europe will stay low.

Base case: Primary energy

The gradual transition in the fuel mix continues...



The share of gas in the total primary energy consumption is rising and that of oil and coal is dropping. The share of renewables is also going up fast but because they are starting from a low base you have a long way to go before they can constitute a sizeable share of the mix. Many argue that renewables are going to grow a lot faster but I am not so sure. It takes a huge amount of investment to increase renewables. And that investment is not forthcoming, not even in Europe.

4 The Gazprom factor

I will now turn to what I call the Gazprom factor because it is important to what is happening around us, in Turkey and in Europe. Given the importance of Europe to East Med Gas export aspirations it is important to examine the impact

Gazprom has on European gas demand and supplies in more detail.

Gazprom settled its anti-trust case with Europe in April by adapting its contracts and approach to be compatible with EU regulations.

Europe took Gazprom to court for monopoly and control of prices and other practices, which were unacceptable to Europe. They have now settled that. Also Europe withdrew its objections for Gazprom proceeding with Nord Stream 2, a pipeline that comes from the north through the Baltic Sea into Germany to supply as much as 55 billion m3 of natural gas per year. Gazprom will also go on with Turk Stream 1&2 carrying another 31 billion m3 per year through Turkey. Half of this will be sold to Turkey and the other half to Europe through the South Corridor in Greece.

So, Gazprom is not only supplying Europe with a lot of gas but it is planning to supply even more. Gazprom is planning to shut down its supply through Ukraine which is why it wants its pipelines to bypass Ukraine.

BP predicts that Gazprom's gas supplies to Europe will grow to 40% of total supplies by 2035. Shell agrees with that prediction. Both Shell and BP are two of the strongest partners of Gazprom in Europe.

Gazprom has already developed a number of new gas fields. As a result of that they have something between 100-150 billion m3 a year of spare capacity they can send to Europe very quickly. Just to give you an idea if we were able to export from Aphrodite the maximum quantity we would be able to produce would be about 8 billion m3 per year. Compare that with Gazprom's annual spare capacity of natural gas of between 100 and150 billion m3.

Gazprom can also have a very competitive pricing. To produce, it is costing them US80 cents per million BTU. They can get gas to Europe at as low price as $3,5/million BTU and still make a profit. Nobody can beat that. It is a price that nobody can compete with. Last year's average price of gas in Europe was $4,7/million BTU. For this year so far, the average price is about $5/million BTU.

I was in Amsterdam in May presenting at the biggest gas conference in Europe. Projections presented were that on average $5/million BTU will remain the price of natural gas for a very long time, 20 years into the future.

Coming to our case, market prices are against us. It will cost Noble about $2-2,5/million BTU to produce natural gas from Aphrodite. We will need another $3,5/million BTU to get it to Europe by pipeline. Add another cost to get it into the European distribution system and a profit and the required price can easily rise to $7-8/million BTU. This is where the problem is. We cannot find buyers at those prices.

In Europe, Russia's main competitors are Norway and Algeria. Neither of them has capacity to supply more gas than they already do. Norway at the moment is supplying about 100 billion m3 per year and they made it clear that they can go up a little bit but not much more. So as Europe will need more gas, there is only one supplier that can supply it and that is Russia. Gazprom has the capacity and is prepared to defend its gas markets in Europe and Turkey.

5 LNG from the United States

The United States is a net exporter of LNG but to sell to Europe profitably, the price will have to be close to $7/million BTU. With Russian gas at $5/million BTU prospects are limited. The United States has been trying to sell its LNG to Europe, but is not succeeding, despite the fact that it is politically attractive. Gazprom is now complying with European regulations and requirements and is in a position to effectively defend its market position.

The future for Europe is more gas, as indigenous production goes down. As additional supplies will be required, Gazprom will be able to deliver them through the new pipelines it is constructing.

The United States has pushed very hard for the Southern Gas Corridor, a most complex gas chain stretching 3.500 kilometers and crossing seven countries, bringing gas from the Caspian to Europe through Turkey and Greece. It will be delivering about 10 billion m3 whilst Europe needs 500 billion m3 a year. So Gazprom is not particularly worried about it. In fact Gazprom may use this pipeline because it has spare capacity and meets European rules. If Gazprom asks to buy this spare capacity the owners of the pipeline cannot refuse. It will be ironic that Gazprom will acquire capacity in a pipeline that was built to avoid Russian gas.

The fact remains nobody can compete with Russian gas to Europe. Europe is happy about it because even though they have been talking about diversification

of energy supply, no one is fighting for diversification anymore. It is a policy that is being pursued but not very vigorously. They are happy because Gazprom provides cheap gas complying with European regulations.

A recent article on Bloomberg, argued that Russia will remain Europe's largest gas supplier for at least two more decades driven by low prices and also by a switch to a higher share from renewables in the energy mix. With Russia providing more gas and with renewables increasing their share in Europe's energy mix, there is not much room for anybody else.

6 Implications for global prices

Let me talk about the implications for global gas prices. Clearly with a fast changing global energy landscape not all hydrocarbon discoveries will be consumed by 2050. This means that increasingly there will be strong competition between producers to capture a much more limited market. We have big producers like Saudi Arabia and OPEC, Russia and the United States and many other smaller producers. All of them will be fighting to get a share of that market which is becoming smaller and smaller. Low cost producers will use their competitive advantage to increase their share of the market at the expense of higher cost producers. This is what Russia is now doing in Europe. They are using their cost advantage and their low cost prices to keep everybody else out of Europe and they are succeeding.

More costly producers will find it difficult to compete and will increasingly run the risk of remaining stranded as the world gradually shifts from fossil fuels to renewables. We have already been observing this since 2014 with persistently low oil and gas and coal prices. This is one of the main reasons why gas prices are very likely to remain low for the longer term, forever in fact, as there is too much oil and too much competition.

6.1 Global gas prices

At a recent gas conference in Europe the average price forecasts over the next 20 years were: $5,50/million BTU for Europe and $7,50 for Japan JKM (Japan Korea Marker). Once allowance is made of the cost of shipping and regasification - $1.50/million BTU for Europe and $2.50/million BTU for Japan JKM, the challenge becomes evident.

East Med gas field development and production, transport by pipeline to a liquefaction plant, liquefaction and profits, will have to be recovered within these prices. It is impossible for exports to Europe and challenging for exports to Asia.

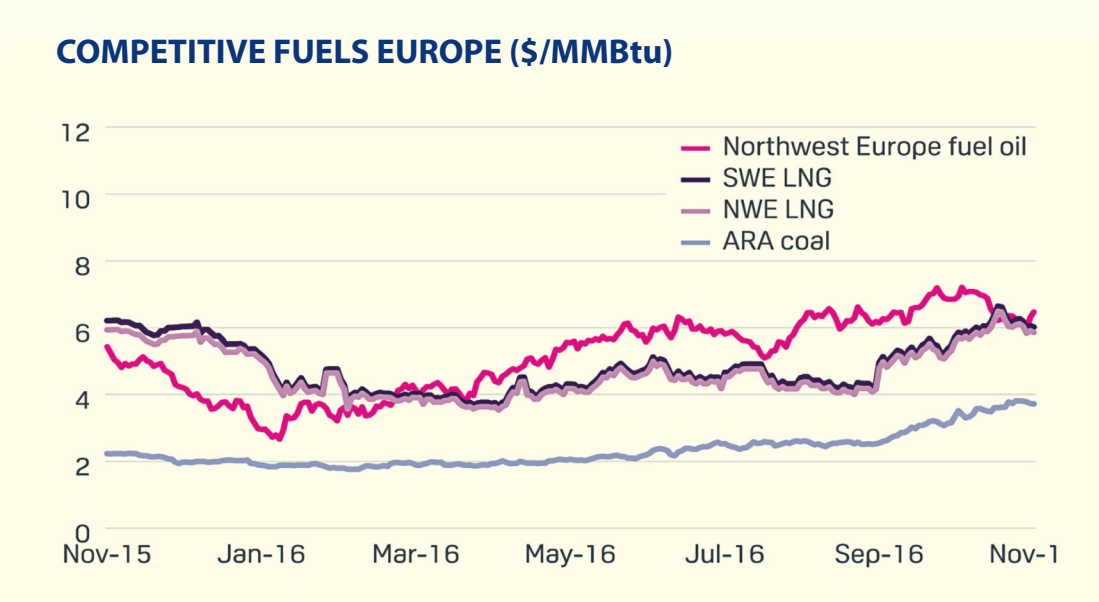
6.2 Gas in Europe

Overall gas demand in the European Union remains about 20% down from the peak ten years ago and predictions are it has peaked already. According to BP, future gas growth in Europe will probably resume as the economic growth rises but it will grow very slow at about 0,5% per year on average. The key reason for this is cheap coal and subsidized renewables. Coal is costing a little more than half of the price of gas, which is why Germany with its policy of clean energy is still using a huge amount of coal. Poland is refusing to switch away from coal. Turkey and Greece and also other mainly emerging countries are actually building coal power plants. Demand for coal in Europe is increasing despite environmental issues because it is so cheap. If you look at Asia, mainly China and India, and also Africa, coal consumption is not going down despite pollution problems. In other words 'cheap' matters more than 'clean' in some parts of the world at least.

Renewables are subsidized, which encourages many companies to invest in them. The depletion of indigenous resources of gas in Europe means that imports will be growing as I said before. Gazprom estimates that Europe will need another 15 billion m3 of gas per year by 2025 and an additional 85 billion m3 per year by 2035.

Gazprom is making plans to provide all of that by itself, leaving no room for anybody else. All this is happening despite efforts by the European commission to diversify energy supplies. They actually tried very hard to diversify but cannot get supplies of this magnitude from anybody. They looked to North Africa, to Iran, Turkmenistan and Azerbaijan but they could not get the supplies of gas they need. The only two possible countries that can provide Europe with adequate quantities are Russia and the United States. But the United States cannot compete with Russian prices.

In this context as we discussed before, there is no prospect of these prices going up. Prices will stay low for a very long time. As a result Europe is not really a market for East Med gas and an East Med pipeline is therefore of project of no practical relevance.



6.3 Cyprus

In Cyprus the priority right now is the negotiations for a final settlement of the Cyprus problem. I hope it will be possible to avoid failure such that even in the case in which a final settlement is not achieved, it will still leave the way open to continue the negotiations after the elections of February 2018.

As I said before, the third offshore licensing round was a success and there are geopolitical challenges in our region. Exports of gas from Cyprus to Egypt have been the subject of discussion for three years now. Many agreements have been reached, memoranda have been signed, pipelines have been designed but no single molecule of gas has gone to Egypt yet. The reason why not, is because the project is commercially non-viable.

There is now considerable uncertainty about Cyprus being able to develop its own gas fields and bring its own gas on the island for domestic use. An indication of the prevailing uncertainty on this matter is the fact that the government has now decided to go for permanent imports of LNG for electricity production. We are required by the European Commission, to switch to natural gas for electricity production by 2020 in order to reduce our carbon emissions. Failing to do so will mean that we will have to pay heavy penalties.

6.4 Israel

In Israel they reached agreement on a regulatory framework for developing their

gas reserves. They took a long time contemplating their national strategy in relation to the development of their gas fields, and they finally have come to an agreement amongst them.

Israel has been looking for taking gas to Egypt for liquefaction and export. Commercially however, this option is no longer viable. There are also political problems between Israel and Egypt that stand in the way. You may not be aware of it but the International Court of Commerce ruled against Egypt for the interruption of gas supplies from Egypt to Israel. Accordingly Egypt Gas has to pay the electricity company of Israel two billion dollars compensation. Egypt is contesting the ruling and stopped all negotiations with Israel.

A possible export market for Israeli natural gas is Turkey. Israel and Turkey have resumed diplomatic relations and are negotiating. This could open the way for gas exports, but again it is not commercially viable.

I do not know if you are aware of it, but about 4 years ago there was a plan to export from Tamar by FLNG and Gazprom was the off taker at the time. I believe Israel may have to come back to the same solution and invite Gazprom to help them with exports. They have a huge gas field in Leviathan about 5 to 6 times the size of the Aphrodite gas field. They will use some of these quantities for their domestic needs but the rest will have to be exported. If not exported, these quantities will stay where they are. If they want to export they may have to bring Gazprom back. Thus FLNG may become an option for Israel.

6.5 Regional markets: Egypt

Egypt on the other hand, expects to become self-sufficient in gas by 2018 and to start exports by 2020.

Egypt already has Zohr which is huge, estimated to contain 30 tcf (trillion cubic feet) of natural gas. There is another sizeable discovery made onshore in the Nile Delta with 15-30 tcf gas. They haven't officially announced it yet because the company that made the discovery is in negotiations with the government of Egypt on a gas contract that also includes prices. Until they close the negotiations which they hope to do by the summer, they won't announce it.

They are also drilling deeper in Zohr because beneath it there is another gas field

about a third of the size of Zohr. Hence, there is a lot of gas in Egypt. On top of all that they have been discovering and developing many other small gas fields. The reason for all of this activity in Egypt is because they have negotiated high gas prices with the gas companies.

If we go back to Mubarak times, the price of gas was fixed to the gas companies at $2,6 dollars/million BTU. On these prices companies stopped drilling and also stopped maintaining the gas fields, which started to go down. Even though Egypt has a lot of gas of its own, it ended up importing expensive LNG because of the short sighted approach of fixing prices.

Egypt suffers from electricity cuts in the summer period when demand peaks due to air conditioning usage. These cuts are very unpopular and politically they need to stop. This led to the government to negotiate with gas companies relatively high prices providing incentives for exploration and drilling activities. The result was finding more and more gas fields and developing them.

Gas demand in Egypt is currently 52 billion m3 per year and may reach 63 billion m3 per year by 2021. Imports are currently 12 billion m3 annually. It is expected however, that imports will stop by the end of 2018 when Egypt will be self-sufficient.

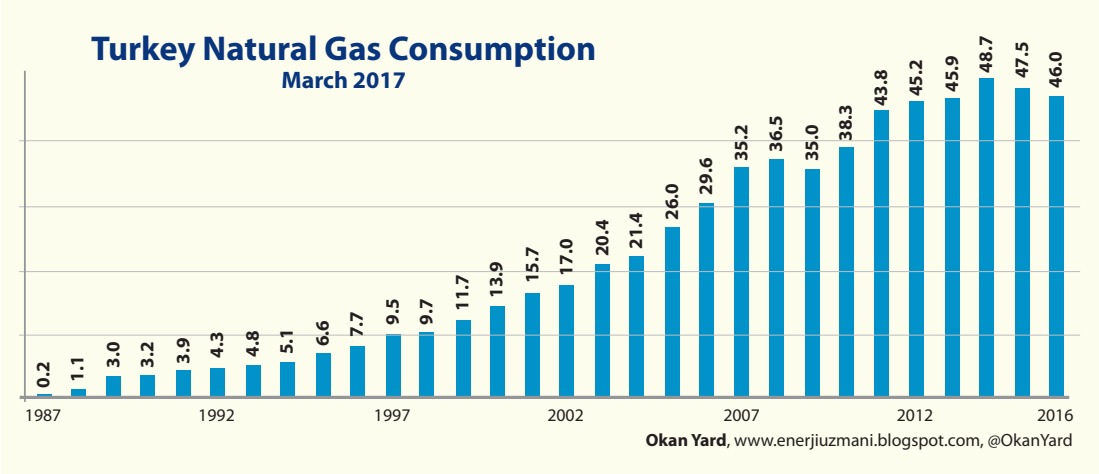
Production this year is estimated at 50 billion m3. BP's West Nile Delta production will be 7 billion m3 a year initially, eventually rising to 15 billion m3 per year. Production in Zohr will be 2 billion m3 per year in December, ramping up to 12 billion m3 a year by March 2018, and reaching a plateau of 27 billion m3 per year by 2019. With 12 new projects to be completed between end of this year and 2019, Egypt is expected to produce 55 to 65 billion m3 per year of additional gas by 2019. Production has been going up in Egypt and pretty soon they are going to have more gas than they need, which is why they will not need any more LNG next year. In addition Egypt is going flat down for renewables and they have a target to produce 20% of their power from renewables by 2022.

So basically Egypt eventually, by 2018, will not need any gas imports from anybody. Egypt has enough gas of its own for its domestic consumption and for exports. So the idea that we are going to sell gas to Egypt is proving totally misguided.

6.6 Regional markets: Turkey

Let's talk about Turkey briefly. Driven by security of supply concerns as well as costs, Turkey has changed its energy strategy and future energy mix. What brought it home was the downing of the Russian fighter and Turkey's concern that Russia might stop gas supplies. Russia didn't but Turkey realized how vulnerable it is to gas imports. It only produces about 1% of the gas it uses. The rest of it is imported. Turkey is very concerned that it is in the hands of others regarding energy security. As a result they have changed their energy policy. They are now trying to reduce the use of gas by increasing the use of coal, which they produce, hydroelectric energy, which they have plenty of, renewables and nuclear. Their nuclear power plant is being built by an agreement with Russia.

As a result, gas imports to Turkey have actually been declining during the last three years instead of going up. Only about five years ago, we were all projecting that gas imports to Turkey will keep increasing because the economy had been increasing very rapidly. But instead of rising gas imports were going down because of its changing policy as I said before.



The Turk-Stream pipeline is back on track with two streams to carry 31,5 billion m3 per year. By 2018 Turkey expects to have also another 6 billion m3 of gas coming from Azerbaijan through the Southern Gas Corridor. The average price of Russian and Azerbaijan gas imports to Turkey at the end of last year was only $5/million BTU, which is the same price as in Europe.

East Med gas, if it is going to make it there, it needs to beat this price. In April I was in Istanbul attending the Atlantic Council Summit, of which I am an associate member. All of us in the Atlantic Council were invited to attend the meeting and

there was a session in which the under-secretary of energy of Turkey was talking. I asked him what is driving gas imports to Turkey. And he said it is only one word for it "price". The under-secretary was insisting that price is the driving factor, not reliability and security of supplies that presumably Israel can provide, but cannot provide the price.

By the time Israel can get gas to Turkey it will cost $6,5/million BTU. That price is not competitive by today's standards. So the concern we have that the pipeline will go through the Cyprus EEZ which will create problems, it will not come to be. The pipeline will not be built, even if Turkey and Israel agree a framework, because it is not commercially viable. Israel has also been talking about exporting gas through Turkey to Europe which is even less viable.

So even though discussions between Turkey and Israel at the administrative level are carrying on and they will probably reach and sign a framework agreement eventually, exporting to Turkey, no matter how politically desirable it may be, is a different story. Gas will be imported by companies and companies make it clear they are not going to take the risk to import Israeli gas to Turkey, at a higher price, just for political reasons.

Turkey has also made it clear again and again, that new gas imports must compete on price against coal, renewables, LNG imports and Russian gas. Lowest price wins. The average price of Russian and Azerbaijani gas imported by Turkey in 2016 was $5/million BTU. So basically East Med gas has to compete and beat these prices.

7 East Med export Options

Let's talk briefly about East Med export options and export options from Cyprus in particular. We have been talking about exports by pipeline to Egypt for its own use; we have also been talking about exports by pipeline to Egypt's LNG plants for liquefaction and NLG export to Europe and Asia. We have also been talking about exports by pipeline to Turkey for its own domestic use and for exports to Europe. We have been talking about a pipeline from Cyprus to Greece for exports to Europe. Other options include FCNG (Floating Compressed Natural Gas) to regional markets, Greenfield land-based LNG and FLNG to European and global markets.

7.1 The Israel-Cyprus-Greece-Europe pipeline

Let's talk first about the East Med pipeline from Israel to Cyprus, to Greece, to Europe. So, this is considered to be a strategic project for exporting East Med gas by pipeline from Israel through Cyprus to Europe through Greece. It is a pipedream but everybody seems happy that the pipeline would go ahead.

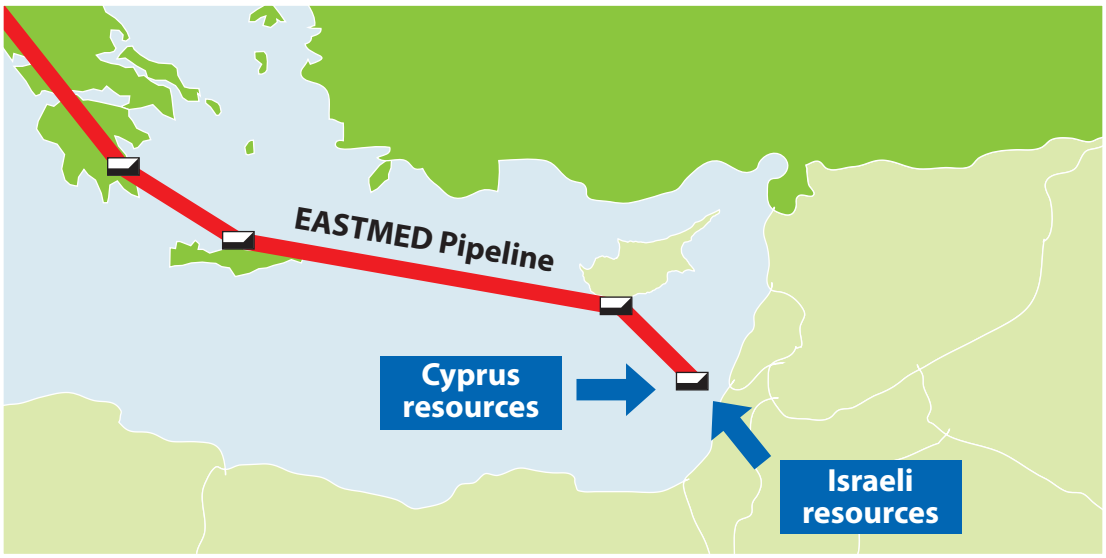
So, earlier in the year, IGI Poseidon completed a pre-FEED study with EU funding. The company doing the study came to Nicosia and made a presentation and they told us that the pipeline is technically and commercially viable but they never told us at what price is it viable at. In fact all the slides they showed were showing percentage factors but nowhere a price. And the reason is very simple. That price has to be $8/million BTU, and at this price the project is not commercially viable.

The pipeline will have to be about 2000 km long by the time it reaches Europe. Along the route there is a crucial part between Cyprus and Crete that goes very deep at 3000 metres. This limits the size of the pipeline to 26 inches and thus limits also the amount of gas that can go through it to 14 billion m3 per year. Technically this is going to be very challenging because if anything goes wrong it will be very difficult to get the pipeline up from the deep for repair work. It will be very difficult to do repair work at a depth of 3000 metres. You can't send divers at this depth, only Remotely Operated Vehicles (ROVs).

Even if the pipeline may be feasible technically, commercially it is a different story. The study estimated the pipeline will cost $5,4 billion to reach Greece and $6,4 billion to Italy, which may be an underestimate according to industry experts. Nevertheless, it would cost $8/million BTU to take gas through the pipeline when the price of gas imports in Europe is $5/million BTU.

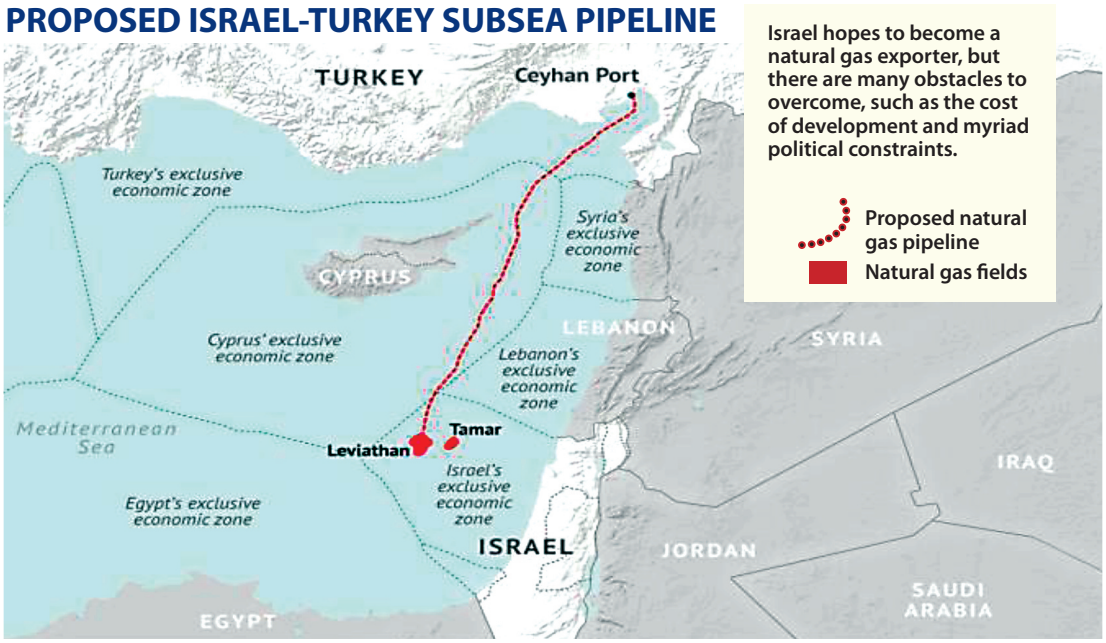
The key conclusion is that the East Med pipeline is not commercially viable as of prevailing market conditions. The East Med pipeline may have all the political support it wants, it will not happen unless it is commercially viable. The European Commission even said they will support the pipeline financially. Some press articles wrote that the EU will fund the pipeline. The hard reality is that the EU cannot fund the pipeline. The EU has □5 billion available to fund about 250 projects of common interest. They can provide support for these projects seed money in other words, may be even as much as 10% of total costs at most. But that will not be enough to make the pipeline commercially viable. The pipeline will not

happen simply because the EU or Israel want it to happen. Companies need to build it. That will happen if a pipeline is commercially viable, and these companies can make a profit, which is not the case for the East Med pipeline.



7.2 The Israel to Turkey gas pipeline

The Israel to Turkey pipeline I mentioned before is not viable either. The pipeline from the Leviathan gas fields to Turkey will be about 540 km long and will cost $3 billion to construct. The pipeline will be able to carry 8 to 10 billion m3 per year. The cost of Israeli gas to Turkey via this pipeline is estimated at $6,50/million BTU which is much higher than what Turkey pays today.



Cyprus may object to the construction of the pipeline via its EEZ but cannot stop it. But it may not need to do so if the pipeline is commercially non-viable. It will not be built.

7.3 FLNG: Potential Use in the East Med

So where does all this leave Israel or Cyprus? If all of these possible export routes are not viable how can we export our gas? One method is Floating LNG and I know that if Total are successful in drilling in Block 11, they will consider this option. Why FLNG? The reason is that there are no other export routes and Israel and Cyprus lack gas export infrastructure. East Med deep water gas fields are expensive to develop and regional gas markets for exports have a finite demand. European markets on the other hand are saturated. This leaves Asia as a potential export market. Given the long-term structural change that has been taking place in global gas markets in recent years, FLNG could be the game changer in the development of East Med gas in a financially viable manner.

FLNG is no longer a new and unproven technology. The first FLNG ship became operational earlier this year in Malaysia. FLNG units are easily deployable and can be used offshore combining gas production, treatment, liquefaction and export. There is no need for separate exploration, production vessels, pipelines and land based LNG facilities. There are no environmental issues and no social issues. People cannot go and object because this does not involve building anything in anybody's backyard. FLNG overcomes these problems.

In both Cyprus and Israel land access, delays to various permits, resistance and hostility from local populations can add years to an LNG project. When I was still working with the Cyprus Hydrocarbons Company, Noble was still planning to build an LNG plant at Vasilikos. But due to delays in decision making and other reasons that opportunity was lost. With Delek pleading between 2010 and early 2013 to bring gas from Israel for liquefaction in Cyprus, that was a serious opportunity.

Noble did a study and invited all those who had to give permits for the LNG plant to be built. When Noble added up all of the numbers they were given, they concluded that it would take 5 years to get the permits through. This by itself could destroy the project. Five years is impossible time. It should have been months not years. An offshore facility doesn't need any of that. And it leads to cost efficiencies.

Now, why do I believe FLNG is possible? It is because there is actually a similar project being considered right now and the first FLNG became operational earlier this year in Malaysia. Shell's Prelude will start operations in 2018. There is a gas field in Mozambique called Coral which is about the same size as Aphrodite and it belongs to ENI. This is a 3,4 million metric tons per year facility at 1500m-2300m water depth.

ENI has proceeded to design an FLNG facility and Coral FLNG has achieved FID. BP has already bought all of the LNG that would be produced by this floating facility for exports to Asia. So, if BP estimates it will make money and bought LNG already, and it is take or pay, it means that they are confident they will make money out of it. So FLNG can make money here as well if we export it to Asia. It is a possibility.

As I said to you before, Total will consider it and it may end up the only option for Israel because Israel has less export options that we do. The key conclusion is that FLNG may be a viable option for East Med also.

8 Implications for East Med gas

Let's talk briefly about the implications for East Med gas. As I said at the beginning, BP concluded that over half of the globally recoverable oil and gas resources would not be exploited and they would remain were they are. If East Med assets are to avoid falling into this category, in other words staying where they are, and getting nothing out of them, they must develop at competitive prices and secure export markets within the prevailing, long-term, low price environment which will be with us practically forever. Whichever export option is considered prices in Europe will need to rise to over $8/million BTU to make it viable. So pipeline options are not going to happen. This is the main reason why Leviathan and Aphrodite have so far failed to secure export markets and they have been trying hard. Noble wants to monetize Aphrodite and take money out of it. They don't want the gas sitting there for years. But even after all these years it has not been able to find buyers.

As I said before I find it surprising that in relation to East Med gas exports the price factor is ignored in this part of the world. We seem to believe that Europe would buy our gas at any price for strategic reasons. We keep saying that Europe needs to have diversified gas supplies for strategic reasons and they would buy

our gas. Europe doesn't buy gas, companies buy gas for profit. They would not buy if it is too expensive.

East Med gas must be developed at competitive prices and secure export markets within the prevailing low price environment if it is to succeed.

9 Politics and reality

Clearly the development of gas resources and their transportation to markets has far-reaching implications for the East Med. In a rapidly changing energy world and an era of plentiful energy resources, for exports to succeed they must also be commercially viable.

The role of governments including the European Commission, is to put in place frameworks and agreements and if need be, regulations also, in order to facilitate sales and trading, not to actually do it. In East Med politics, a different impression prevails, that political agreements are often considered to be as good as constructing the pipelines and selling the gas. You remember only last year when Cyprus and Egypt were signing an agreement and we were all celebrating in Cyprus, in newspaper articles with prints, "We sold our gas". That is not happening.

The European commission is supporting the East Med pipeline because it could provide another alternative route for gas to Europe, provided it is cheap, but it is not. It is also supporting it because its member states Greece, Cyprus and Italy are behind it. Even though the European commission may provide limited support towards the cost of constructing a pipeline it would not fund it. This is the role of commercial companies.

10 Conclusion

Gas companies need to secure firm gas sales contracts before they can reach project FID and construction. But so far this is not happening. The industry looks at all these schemes for developing East Med gas with a lot of skepticism. There is skepticism about prospects for East Med exports because simply markets are not there.

In addition, the East Med region is geopolitically volatile. Also, developing and exporting gas is a challenge especially in the prevailing low demand and low price environment in Europe.

But there is some hope and I will tell you why. In the longer term and especially if Total is successful in drilling in Block 11 as we all hope, FNLG may become a serious option for gas exports to Asian markets. This is a possibility.

East Med plans however, need to be tempered with a dose of reality. We need to stop feeding people with all of these promises and inflated expectations. Competition to secure markets is fierce and prices will stay low. Developing our gas fields is not going to happen now, it is not going to happen easily and when it happens, given low prices, profits will be modest.

Gas discoveries in the East Med are deep water and expensive to develop. They are also far from the markets in Asia. So a key element here is collaboration between the companies to keep development costs down. I welcome the fact that ENI and Total formed a joint venture for Blocks 6 and 11 and now ENI and ExxonMobil may form a joint venture for Block 10.

The ultimate will be a joint venture between all of them, basically Total, ENI and ExxonMobil forming a big joint venture with all of the gas fields coming under the joint venture and done as one single project. Only integrated projects may have a chance of succeeding in limiting development and production costs, thus increasing chances to secure export markets, and, even then, it will be challenging.

I am hopeful that Total will make a discovery in Block 11. I am also quite hopeful that ExxonMobil will make an even bigger discovery in Block 10. In effect, finding gas is probably easier – selling it is the challenge. If they put all of these gas fields together, and if they have a single joint venture with no interfaces, no duplication of risk provisions, costs and profit, then costs can be minimised.

This cost effective development concept will likely involve subsea completions for each gas find, and very likely pipelines to Egypt, gas treatment and new LNG trains by expanding the existing LNG plants, thus benefiting from existing infrastructure. Only by doing it this way we will be able to cut costs to minimum. A grand collaboration among all players in the Cyprus EEZ would indeed be the best in terms of minimizing development costs and improving chances of securing exports. The reason why Egypt, it is because it will be cheaper than

building an LNG plant at Vasilikos. In a low cost environment, this lower cost could make all the difference between finding buyers or not.

We have good companies here. ExxonMobil is No. 1 in the world, Total is No. 4, ENI is No. 10. They are all strong companies. If there is anybody who can make it happen it is they. But even they cannot control markets and prices. If they do not produce within the prevailing prices they will not be able to sell.

If we manage to get that far, it will take a relatively long time before Cyprus will see any serious income. It will take 2-3 years to develop and design the project, sell the gas, secure finance and reach FID. Another 3-4 years will be needed for construction, and for the first 3 years most profits will go to cover the cost of the facilities. This, hopefully, also gives ample time to solve the Cyprus problem.

We must not build hopes that money is going to come tomorrow because it may not come at all, unless we secure markets. Even if we do, the margins are low and hence the profits will not be very large. Just as an example, even if we have 20 trillion cubic feet of gas, which is about 5-6 times Aphrodite, the possible profit all together could be $1-1,5 per million BTU which means between $20-30 billion over 20 years, to be divided 2:1 with the companies. Thus we could potentially get $12-20 billion over 20 years, or $0,6-1,0 billion per year. This is good money relative to our GDP, but this will not solve all our problems. We need to temper our views and expectations with realism and pragmatism.