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Impact of Global Markets on East Med Gas Developments

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1. OVERVIEW

The world is going through a major and permanent transition from high-carbon to low-carbon energy, with a relentless increase in the use of renewables at the expense of fossil fuels. These factors also impact global gas markets and prices and have implications for East Med gas developments.

The key factors affecting energy globally and in the East Med:

- Global energy markets are undergoing permanent structural change
- The Paris Climate Agreement¹ has set as a goal limiting global temperature increase to less than 2degC by 2100
- Limiting carbon emissions and increasing energy efficiency and use of renewables are having a major impact on the global energy mix
- In November 2017 solar PV was down to 1.77 US-cents per kWh at an auction in Mexico², and a wind power auction in Germany produced 2.2 euro-cents per kWh³. The world's biggest electricity storage battery, 150MW ^{Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.}, is about to go online in Korea⁴, with capacity 50% up on Elon Musk's 100MW battery commissioned in Australia in November 2017, with more coming. These are monumental developments in rapid succession, hastening the wider and faster penetration of renewables.
- US shale is changing global oil and gas norms
- An oil, gas and LNG glut, and cheap coal holding its ground, in global energy markets have led to low prices

The key outcome from these developments is that the world is moving to an era of ever-increasing renewable energy, leading to long-term energy abundance and low prices.

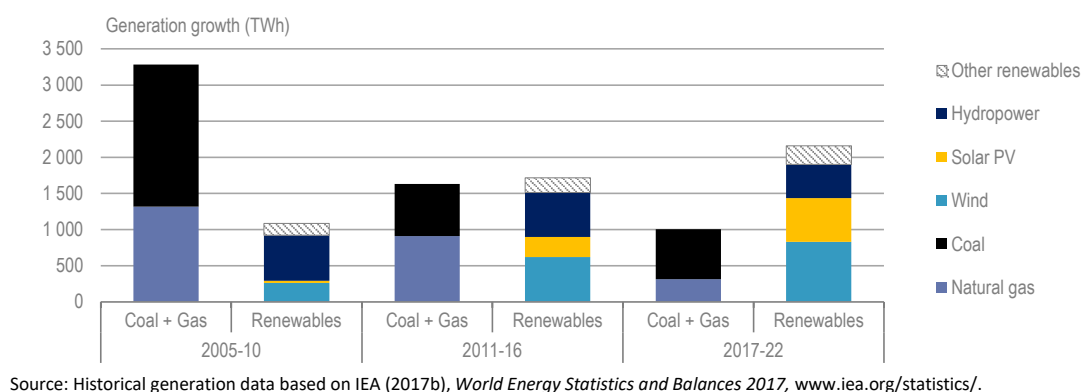
2. IMPACT OF RENAWAREBLES

New market reports released by the International Energy Agency (IEA), Renewables 2017⁵ & WEO 2017⁶, highlight some of the challenges natural gas faces, even though gas demand is expected to grow.

The reports conclude that electricity will be the main form of energy by 2040. They show that new records have been achieved by renewable energy, which accounted for two-thirds of all global net electricity capacity growth in 2016 and it is expected to increase further over the next 5-years, and beyond.

The contribution from fossil fuels to electricity generation growth is declining rapidly, while the contribution from renewables (including hydro) is increasing dramatically. Fossil fuel additions to global electricity generation dominated in the period to 2010, but this has been reversed, with renewable additions taking the dominant role now and in the future, Fig 1⁶.

Fig 1 Renewable and fossil fuel growth in net electricity generation

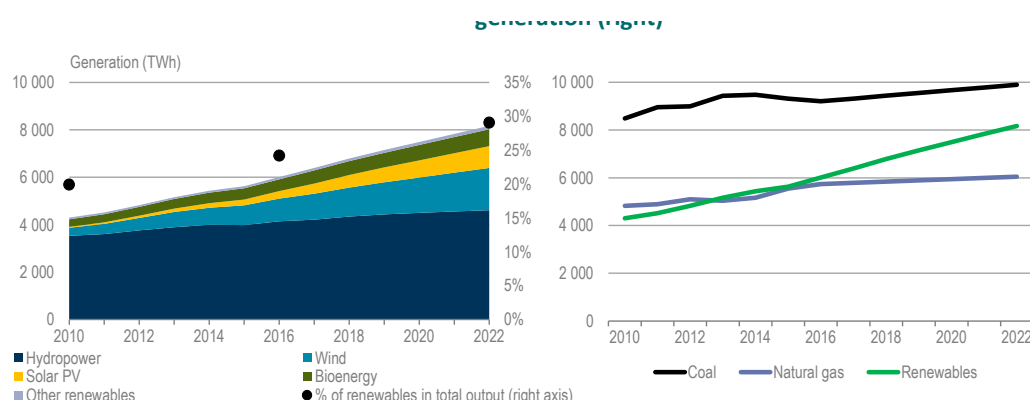


Source: IEA, Fig 2.3

Over the next five years, growth in renewable generation will be twice as large as that of gas and coal combined. While coal will remain the largest source of electricity generation in 2022, renewables close in on its lead, Fig 2⁶. However, the same cannot be said for gas. Growth of natural gas in power generation remains anemic over the next five years, slower than that from coal and the gap is widening⁷, Fig 2. But nevertheless, as Fig 2 shows, gas has a significant role to play in future in a rapidly changing global energy mix⁸, provided it remains competitive.

The contribution from renewables to global electricity generation has already surpassed that from natural gas and by 2022 it will be one-third bigger, Fig 2.

Fig 2 Global electricity generation by fuel



Note: The share of renewables in total power generation includes electricity from hydropower pumped storage.

Source: Historical generation data based on IEA (2017b), *World Energy Statistics and Balances 2017*, www.iea.org/statistics/.

Source: IEA, Fig 2.2

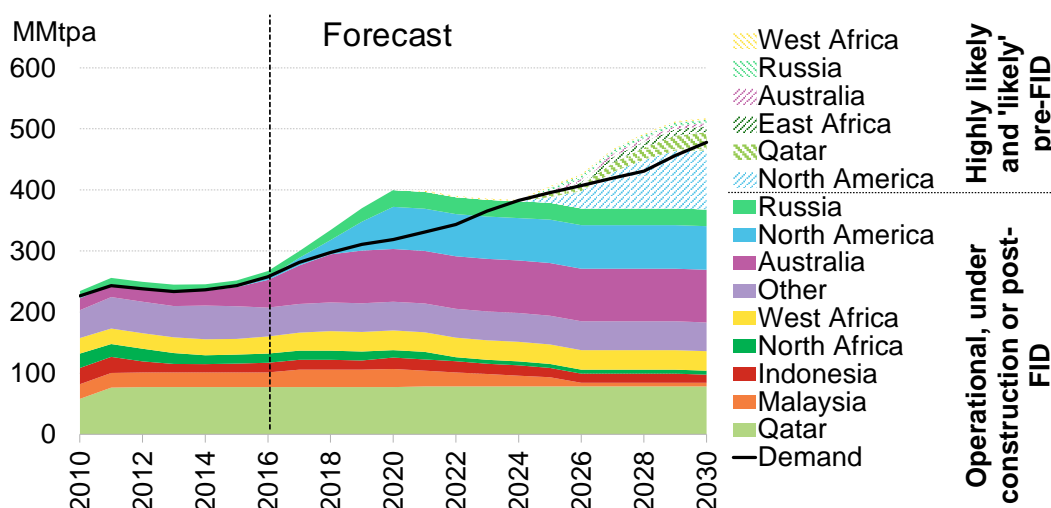
With cheap coal holding its ground, future increase in the use of gas is facing challenges. The IEA^{5,6} concludes that ensuring that gas remains affordable is critical for its long-term prospects against renewables and coal⁸.

3. GLOBAL LNG SUPPLY AND DEMAND

LNG is currently receiving considerable attention mostly driven through easy access, low prices and the fact that the world is moving into a prolonged period of an LNG glut. Questions being asked include: where are the markets heading, what is the impact on prices, what is the impact of US LNG, can markets absorb excess LNG?

The good news is that Bloomberg NEF⁹ forecasts that global LNG demand will grow from 258 million tons/yr in 2016 to 480 million tons/yr by 2030, Fig 3.

Fig 3 Global LNG supply/demand balance



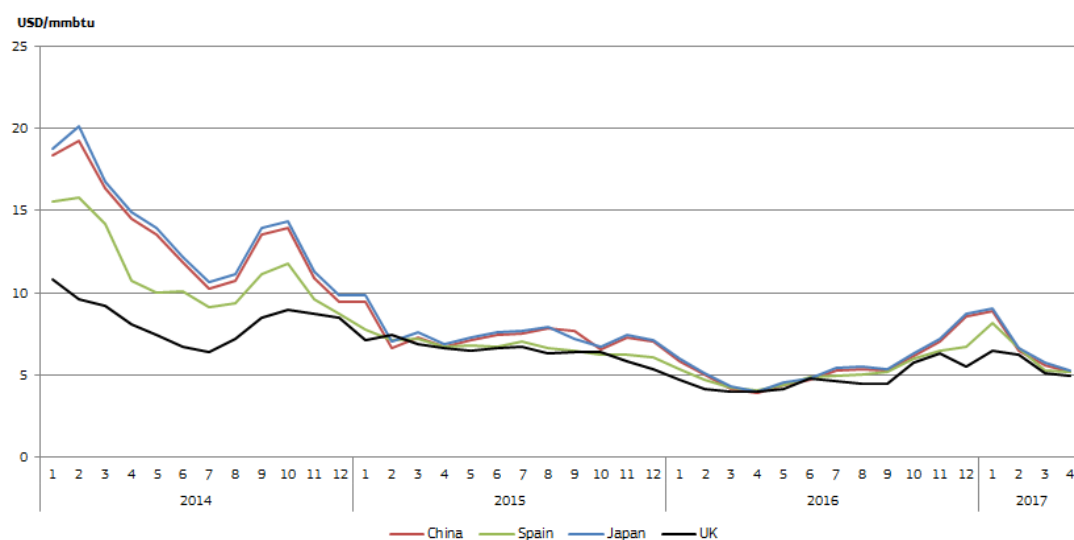
Source: BNEF

But over the next five years supply is outpacing this, creating a very competitive global LNG market and a decisive move towards short-term and spot LNG, with buyers having the upper hand.

In addition, a new wave of competitive LNG post-2025 led by Qatar adding another 23 million tons/year to its exports, US, Russia and brownfield expansions is on the way, Fig 3.

These factors are driving prices down. They are also helping price convergence between European and Asian spot prices¹⁰, Fig 4.

Fig 4 Landed spot LNG prices



Source: Thomson-Reuters Waterborne ^[1]_{SEP}

https://ec.europa.eu/energy/sites/ener/files/documents/quarterly_report_on_european_gas_markets_q1_2017.pdf - Fig 18

Despite the expected LNG glut, so far all produced LNG has been finding buyers, including China with its drive to cut-down smog in its major cities¹¹. This is due to low prices, the flexibility offered by FSRUs opening up new LNG markets and the drive towards emission reductions.

However, the need to keep prices low was highlighted in November 2017 by Japan's JERA, the leading LNG buyer in the world. JERA¹² said that "LNG price should be reasonable [ie low] and there should be flexibility...Compared to coal, as a fuel source for electricity, natural gas is more than 1.5 times more expensive even at \$6/mmBTU. If the price increases, it will not be competitive at all" and will probably be replaced by cheap coal. This applies to most Asian countries.

The outcome of these developments is that the global LNG market will remain competitive and longer-term prices will reflect this.

4. IMPACT OF US LNG

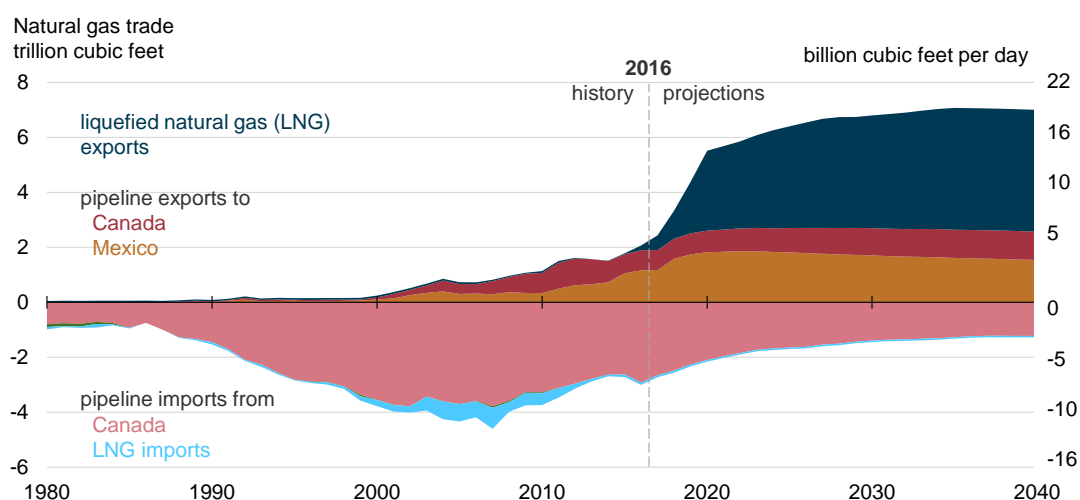
US shale gas is becoming more efficient to produce and is growing faster than US gas demand, which is remaining relatively flat, increasing pressure on US gas prices¹³. This is especially the case with associated shale gas that needs to be evacuated, if it is not to slow down the growth of shale oil production. The solution to this lies in increasing US LNG exports, where the next world LNG wave will probably come from¹⁴.

A second wave of US LNG is being developed, finding ways to compete on price. Tellurian¹⁵ says it can land LNG to Japan at \$6/mmBTU through upstream involvement and small-scale liquefaction. Going further, NextDecade Corporation¹⁶, promoting Rio Grande LNG, said in November it can build LNG plant at <\$500/ton – and has access to very cheap associated shale gas.

US LNG is characterized by transparent hub pricing and no destination restrictions. In addition, it can go anywhere in Europe, South America or Asia – Cheniere has reached 25 countries in 18 months – global reach is having a leveling effect. The US Energy Information Administration (EIA)¹³ forecasts increasing US LNG exports, mostly based on projects that are already being planned, but there are more to come due to the ever-increasing, low cost, US gas production, Fig 5.

Fig 5 US natural gas trade forecast

Increased natural gas trade is dominated by liquefied natural gas exports in the Reference case



Source: EIA AEO2017

https://www.eia.gov/pressroom/presentations/sieminski_01052017.pdf

US LNG producers are confident they can capture the lion share of new LNG demand in Asia.

It is clear that US LNG is changing global LNG markets the same way as shale oil changed global oil markets – it is leading to LNG commoditization.

5. IMPLICATIONS ON GLOBAL GAS PRICES

Clearly with the fast-changing global energy landscape, as BP¹⁷ and the IEA⁶ indicate in their long-term outlooks, not all remaining technically recoverable hydrocarbons and coal resources globally will be consumed even by 2050. This means that increasingly there will be strong competition between producers to capture this more limited market. As a result mostly cheaper resources will be able to be developed and compete, mainly in the Middle East, US and Russia. Low-cost producers will use their competitive advantage to increase their share relative to higher-cost producers – as for example Gazprom is doing in Europe.

More costly resources will find it difficult to compete and increasingly run the risk of remaining stranded, as energy efficiency increases and the world shifts from fossil fuels to renewables¹⁸.

We have already been observing these low fossil fuel prices since 2014 with persistently low oil, gas and coal prices.

These are the main reasons prices are very likely to remain low for the longer term.

As the IEA says in its World Energy Outlook⁶, in order to maintain stable growth of gas and LNG business, maintaining continued competitiveness against coal and renewables is critical for the long-term prospects of gas.

The upheaval in the global gas market is contributing to major changes in gas price formation mechanisms globally and a convergence in global prices¹⁸. In addition, any expectation of gas price hike in the future, as a result of high oil prices, has receded as oil prices are staying low, likely forever.

With abundant supplies and buyers having the upper hand, the target for natural gas is security of supplies at competitive prices against other energy sources.

Long-term estimates of natural gas prices by international experts average¹⁹: Europe: \$5/mmBTU and Asia: \$7/mmBTU.

But now we have the new wave of US LNG on the way, with Tellurian¹⁵ and NextDecade Corp¹⁶ at the forefront, promising to land LNG to Japan at \$6/mmBTU, based on low cost associated shale gas and new competitive liquefaction facilities. With the new LNG wave, these prices are likely to become the new target in Asia.

Should average gas prices in Europe rise much above \$5-\$6/mmBTU, they will open the door for increased imports of US LNG. With Gazprom determined to safeguard its European markets²⁰, this is not likely to happen. Low prices have also been helping Gazprom increase its gas exports to Europe for the fourth consecutive year despite sanctions and European Commission calls for diversification of supplies. East Med gas needs to beat these prices if it is to make any inroads into Europe.

There is an increasing convergence in global gas prices, Fig 4, which are likely to stay low for the longer-term, making it difficult to commit investments in new LNG projects with costs outside these ranges.

6. EAST MED REGIONAL DEVELOPMENTS

Clearly these developments in the global natural gas and LNG markets and long-term low prices are having an impact on the monetization of East Med gas. This is considered in the following in the context of prospects in Israel, Lebanon and Cyprus. Egypt is considered in the section on regional markets.

6.1 Prospects in Israel

In Israel Noble Energy and its partners reached FID on 23 February 2017 for Phase 1A of Leviathan²¹, which involves the production of 12 bcm/yr starting end of 2019. Leviathan was discovered in 2010 and holds 622bcm gas.

It took time because of the need to secure firm gas sales. However, this effort was partially successful. The key gas sales and purchase agreement was signed September 2016 with the Jordanian National Electric Company (NEPCO), to supply it 3 bcm/yr gas over 15-years, on an oil price-linked and take-or-pay basis, reported to be over \$6/mmBTU and worth about \$10 billion²². However, this is still subject to political risks. But even though resistance to it in Jordan is still strong, and likely to become more difficult following the reactions to the US announcement that it recognizes Jerusalem as the capital of Israel, it is likely to proceed.

The problem also is that almost all of the other deals, totaling about 2.4 bcm/yr, are with IPPs that have not yet progressed into projects²³.

These uncertain deals are challenging the justification for the investment required to develop Leviathan. There is simply not enough demand even for Phase 1A. However, construction is progressing²³, with the Leviathan partners hoping that once Phase 1A becomes operational it will create its own momentum.

Another key question is what would be the impact of Energean. It is proceeding with development of Tanin and Karish and gas sales²⁴, undercutting Leviathan with substantially lower gas prices, closer to \$4.5/mmBTU, it has so far secured over 4bcm/yr firm sales, more than needed to reach FID possibly early 2018. The gas potential of Tanin and Karish may be double the announced gas reserves, potentially putting even more competition pressure on Leviathan.

Israel is desperate to secure export markets for its gas and the new gas liberalization developments in Egypt encouraged speculation that the way is now open for such exports to Egypt. But this faces major uphill challenges. In addition to the political problems, there is the International Chamber of Commerce Court of Arbitration decision ruling that the

Egyptian companies must pay IEC close to \$2 billion for ceasing gas supplies to Israel in 2012. This is still an obstacle²⁵.

But the greatest challenge is commercial. By the time Israeli gas, with a wellhead price exceeding \$4/mmBTU, reaches Egypt, it is liquefied in new trains and exported, it becomes uncompetitive in global markets.

The EastMed pipeline and potential exports to Turkey face similar commercial challenges. By the time gas from these routes arrives at its destination, it will be too expensive to compete with gas prices in Turkey and Europe²⁶.

These are the reasons why Israel's first offshore licensing round has had limited success. Only Energean and Indian ONGC submitted bids²⁷ and were awarded offshore blocks.

The key conclusion is that Israel faces major challenges securing gas sales and export routes.

6.2 Lebanon's prospects

Lebanon has kicked-off its first licensing round involving five blocks, with awards made to a consortium of Total, ENI and Novatek for two blocks, 4 and 9²⁷. Unfortunately, block 9 is on the disputed border between Lebanon and Israel. This may complicate the process.

Political instability is also threatening the future of this process, which risks being delayed.

The key conclusion is that it remains to be seen whether and when this licensing will lead to successful exploration.

6.3 Prospects in Cyprus

Prospects for additional gas discoveries offshore Cyprus are good. The new drilling round started mid-2017 but the first well by Total in block 11 was unsuccessful²⁸.

However, ENI kicked off its new drilling campaign at the end of December 2018 in block 6²⁹, Fig 6, which appears to have better prospects for a discovery. But this will not be without its challenges, as almost half of it is claimed by Turkey, which has acquired its own drilling rig with the intention of drilling offshore Cyprus and possibly in block 6.

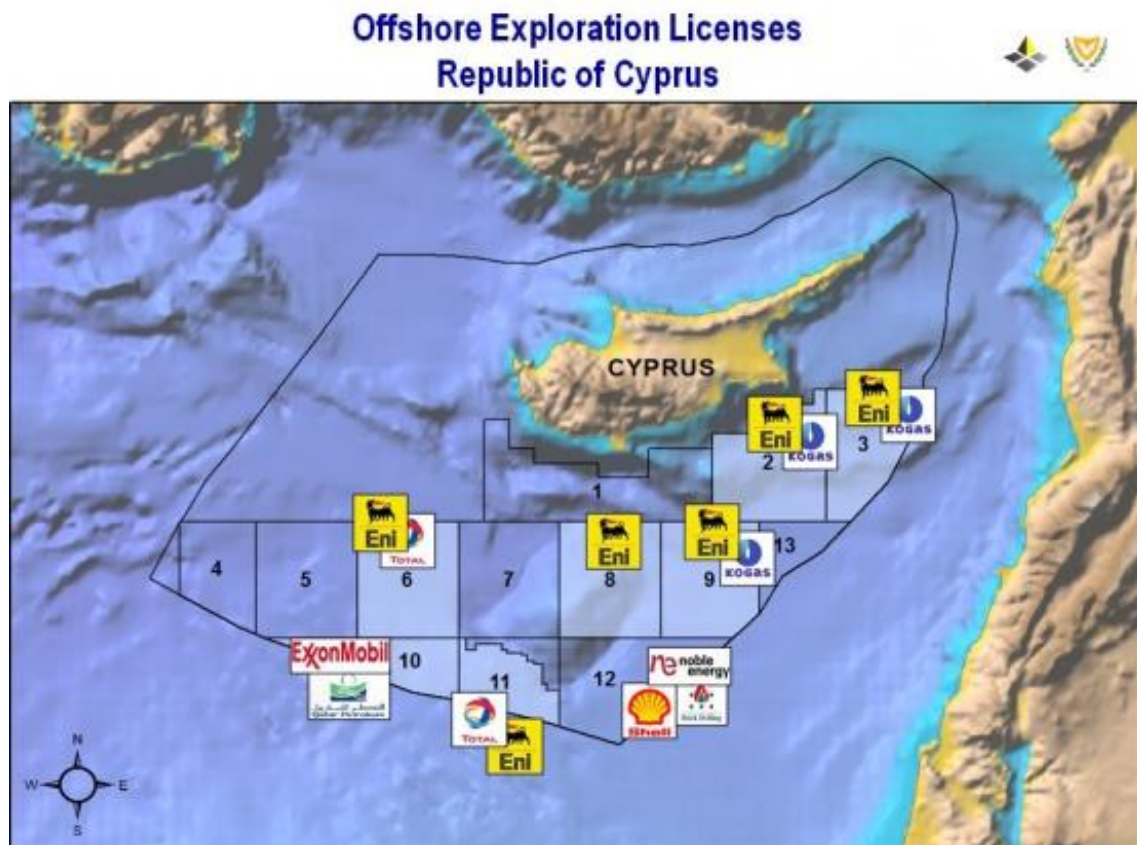
Despite recent events, President Erdogan reconfirmed in December 2017 the importance of Turkey-EU relations. However, Erdogan's Turkey is aggressive in defending 'its own interests' as it sees them, irrespective of EU or international conventions and reactions. Turkey will continue to defend these interests and positions aggressively, however unfounded they are in terms of UNCLOS, the United Nations international law of the seas³⁰. Most international lawyers consider its provisions on maritime boundaries and undersea resources as part of customary international law³⁰. Turkey's actions affect the East Med, Cyprus and Israel.

However, it is unlikely that this aggression, witnessed every time Cyprus drills in its EEZ, will cause a hot incident. It is likely to remain at the level of challenges, harassment and

intimidation. The gas companies are aware of these risks and will continue with their plans and drilling, regardless of what Turkey does, unless it affects the safety of their personnel³⁰.

Turkey's threats have not changed anything so far. Despite tensions, the gas companies believe that the political risk is manageable.

Fig 6 Offshore exploration licenses of the Republic of Cyprus



Source: Cyprus MCIT

<http://tekmormonitor.blogspot.nl/2017/03/cyprus-approves-eni-total-exxon.html>

ExxonMobil confirmed that it plans to drill two exploratory wells in block 10 during the second half of 2018, where seismic data show good prospects³¹.

Decisions on future exploitation of any gas finds off Cyprus were always going to be left until after completion of all planned drilling, by the end of 2018. Much hangs on the more optimistic indications that block 10 may hold significant amounts of natural gas.

However, there is still a long-way between discoveries and successful exploitation through international gas sales. Global gas prices are low, and are expected to stay low in the longer-term, and the global gas market is challenging. The challenge has been and still is securing export gas sales.

Ultimately, collaboration may be key to keeping development costs down. In a low price environment, only integrated projects, which minimize costs from wellhead-to-export, will stand a chance to become financially viable and secure export markets. And even then it will be challenging.

One option to achieve this is if all Cyprus gas discoveries by the end of 2018 are pooled together into a single JV. They can then be developed as an integrated project, with no doubling on interfaces and risks, through subsea completions. Pipelines can then take the gas to Vasilikos or Egypt, whichever is more cost-effective, to be liquefied through new trains and exported. But even then it will be challenging commercially.

Any future developments will depend on the results of the ENI/Total drilling started in block 6 end of December 2017 and ExxonMobil in block 10 during the second half of 2018, Fig 6. If discoveries are sufficiently sizeable to allow profitable gas exports in the form of LNG, then the companies may consider the possibility of building a liquefaction terminal in Cyprus or extending the existing Egyptian LNG terminals at Idku and Damietta. It is not likely that each company would proceed with a separate terminal. Costs exceeding several billion dollars require avoidance of duplication and require collaboration.

This is especially the case with low LNG prices on the world market. To enable companies to keep costs low, so they can compete, they will need to collaborate on joint constructions such as pipelines, gas treatment plants, etc, without doubling costs for interconnections, risk management, financing, operations and management.

It also requires certainty that the natural gas price will be and remain at levels that allow profitable exploitation. Any doubts about the long-term price stability of gas prices could delay such projects. The gas companies work on horizons of 40+ years. As a result, they can afford to wait before proceeding with any project until it becomes financially viable and when the financial returns meet their own goals and expectations.

It is expected that such collaborations will be considered after completion of drilling and analysis of the results, ie in 2019.

FLNG may also become a serious option for Aphrodite-size discoveries for gas exports to the global markets³². FLNG has been shown to be potentially economically viable in a low-cost environment. For example, the final investment decision (FID) for ENI's Coral FLNG in Mozambique was taken in June³³. BP has already purchased all LNG production for exports to southern and south-eastern Asian countries. The Coral gas-field has similarities to Cyprus' Aphrodite gas-field, such as quantities of natural gas, water depth, etc³².

The key conclusion is that Cyprus still has reasonable prospects for new gas discoveries, but securing export markets remains a challenge.

7. EAST MED REGIONAL MARKETS

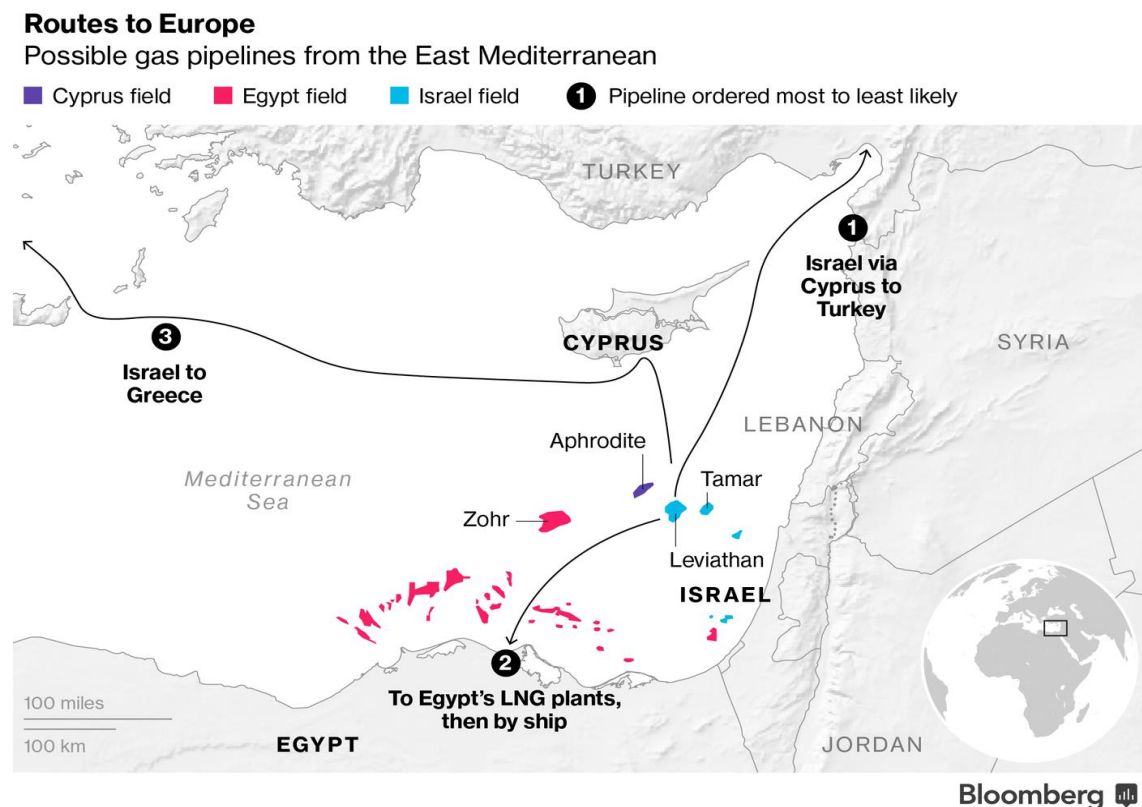
The main East Med regional markets are Egypt, Turkey and Italy. Development of these can benefit from regional cooperation, which appears to be on the ascendancy, but the odd-man out in Turkey.

During November 2017 there were successful bi- and tri-partite meetings in Cyprus involving the heads of governments of Cyprus, Egypt and Greece³⁴. Politically very important to the countries involved but also in promoting stability and cooperation in the region. These may now be enlarged to include Italy, Lebanon, and Israel.

The odd-man out of course is Turkey who does not recognize Cyprus, even though all other countries in the region recognize Cyprus' right to explore its EEZ and export its hydrocarbons to international markets.

The meetings endorsed a gas export pipeline from Cyprus to Egypt and the EastMed gas pipeline, Fig 7. Unfortunately these were portrayed by politicians and the press as done deals. In other words the pipelines are now reality and will be constructed.

Fig 7 East Med gas pipeline options



Source: Bloomberg³⁵

www.bloomberg.com/news/articles/2017-02-06/huge-gas-finds-can-keep-europe-warm-if-their-owners-stop-arguing

This of course is far from being the case. These involve inter-governmental framework agreements facilitating the pipelines. Even though essential, before these become projects it is essential to secure firm gas sales agreements, and there lies the challenge. It is only then that the oil and gas companies will make final investment decisions and commit the multi-billion dollar investments required for construction.

For example, with annual natural gas rates in Europe averaging around \$5-\$6/mmBTU and pipeline cost close to and possibly exceeding \$8 billion, without a major EU subsidy of up to half the cost, the EastMed pipeline is not economically viable²⁶. This is especially so when the price expected at the production platform is more than \$4/mmBTU.

For gas sales to become possible, prices need to recover from today's levels – not likely to happen any time soon, or even in the longer-term. This is the reason that until now, over six years since the discovery of Aphrodite, companies have not announced gas sales, nor are they close to any gas sales agreements.

7.1 Regional market: Turkey

Turkey's energy strategy is based not only on political factors but mainly on economic ones. Energy prices are important. This is clear from Vision 2023³⁶.

Driven by security of supply concerns, as well as costs, Turkey has changed its energy strategy and future energy mix, described in its energy strategy in Vision 2023^{36,37}. The emphasis now is on increasing use of indigenous lignite and coal, hydro, renewables, but also nuclear and LNG, and reducing dependence on costlier pipeline gas imports.

Vision 2023 adopted targets to maximise utilization of the country's lignite and coal potential, by increasing their share to 30% of Turkey's electricity mix. It also includes increasing renewable sources to 30% and nuclear power to 10%, while reducing the share of natural gas to 30%. Turkey is also targeting to reduce energy intensity by 20% by 2023.

In the meanwhile, construction of the Akkuyu nuclear power plant is back on track, with expected production of 4,800MW by 2023³⁷.

In addition, a 2023 target set by the government is that two thirds of power generation should be produced from domestic resources, which are also cheaper than imported gas. By 2016 49% of Turkey's electricity production was from domestic resources and it is expected that it exceeded 50% in 2017. This, inevitably, will reduce dependence on imported natural gas further.

As a result, gas imports to Turkey have actually been going down during the last 3 years, but in 2017 imports may have exceeded 50 bcm/yr³⁷, mainly because of cold weather.

However, when Turkey's economy starts picking-up, requiring more energy, forecasts show that gas demand may increase to 55 bcm/yr by 2025³⁸, substantially less than the 70 bcm/yr predicted only a few years ago.

Over the same period LNG imports are expected to exceed 12 bcm/yr from about 7 bcm/yr now. Turkey's first FSRU is in operation and another one is about to start, further increasing Turkey's diversification and security of gas supplies.

Construction of the first string of the TurkStream gas pipeline is well advanced, with a 15.75 bcm/y capacity. This is more than the 14 bcm/yr it is replacing from the western route through Ukraine. The second string, destined for Europe possibly through TAP or IGTP, is still subject to EU clearance. By 2018 Turkey expects to have another 6 bcm/y added to its gas supply from Azerbaijan through TANAP³⁷.

In fact existing pipelines and LNG import facilities, TANAP and TurkStream, as well as additional LNG import capacity, can provide Turkey more than 70 bcm/yr of well diversified gas by 2025. This is well in excess of forecast demand of 55 bcm/yr.

Even though in total over 36 bcm/yr gas contracts will be up for renewal between 2021 to 2025, mostly with Gazprom, any new suppliers need to compete on price to replace any of this gas – which is a challenge.

And it is cheap gas, costing between \$5-\$6/mmBTU in 2016. According to market data, the cost of Russian gas to Turkey in 2016 averaged \$5/mmBTU and in March 2017 was \$5.2/mmBTU, Azerbaijani gas \$5.5/mmBTU and Iranian gas \$5.8/mmBTU. Coal and domestic energy supplies cost even less.

Turkey has also increased its gas storage capacity to over 10% of its annual consumption, and expects to increase it to 25%, thus strengthening supply security.

Not only Turkey's dependence on natural gas is being contained, but it also has access to plentiful, cheap, supplies. With global oil and gas prices not expected to rise significantly for a long time, if not forever, it leaves little room for other gas suppliers to penetrate this market, unless they can offer cheaper gas. This includes Israel.

Discussions at Ministry level between Israel and Turkey were proceeding well and they were expected to reach a political framework agreement on the pipeline at some stage. But the latest flare-up between the two countries, as a result of US recognition of Jerusalem as capital of Israel, will as a minimum delay any such agreements. However, for the project to materialize Turkish companies must be willing to buy the gas and invest in the project. With the prevailing commercial conditions this is not likely. As a result, the question whether the pipeline can go through Cyprus EEZ, with or without settlement of the Cyprus problem, becomes academic.

The key conclusion is that Israeli and East Med gas has to compete and beat these prices, and may no longer be Turkey's high priority.

7.2 Regional market: Egypt

Egypt adopted an energy sector reform programme in 2017, including liberalization of the gas industry, and subsidy reductions. It also expects to become self-sufficient by end of 2018 and start gas exports after 2020^{39,40}.

LNG imports have been reduced due to increased domestic production. Egypt is also issuing tenders for reduced LNG deliveries during the first half of 2018, but none for the second half. EGAS and the Minister of Petroleum have already confirmed that 2018 should be the last year for the country needing to import gas for its domestic energy market³⁹. New production will more than cover demand by end of 2018.

In addition, Egypt aims to produce 20% of its power from renewables, including hydro, by 2022 and increase this to 30% by 2030^{Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.}. It has also introduced energy efficiency and demand management measures, including phasing-out of fuel subsidies, which are also impacting demand. These measures are expected to relieve some pressure on the oil and gas industry, allowing resources to be diverted to other ‘added value’ sectors, such as petrochemicals and exports.

ENI confirmed that Zohr, with 30 tcf gas, achieved first gas in December, expecting to ramp-up production to about 12 bcm/y by mid-2018, reaching a plateau of 28 bcm/y by 2019⁴².

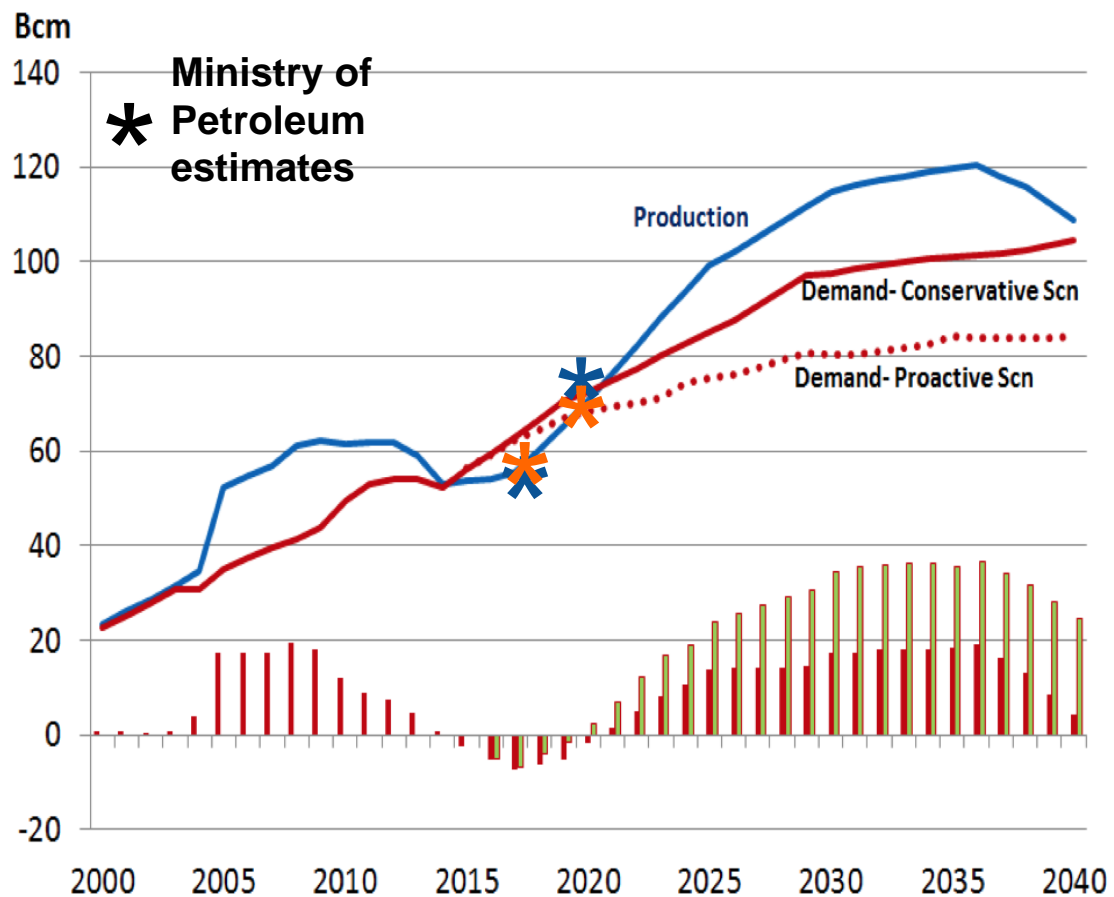
In fact there are 12 gas projects under development, expected to bring an additional 55 to 65 bcm/y gas on stream by 2019⁴², with more to come.

On this basis EGAS and the Ministry of Petroleum expect resumption of gas exports by 2019-2020 utilizing the existing LNG plants at Idku and Damietta.

This is clear from the recent projections made by the Paris-based Observatoire Mediterranéen de l' Energie (OME), Fig 8. These are based on data from companies operating in Egypt, which are members of OME. Superimposed on the graph are gas supply and consumption estimates announced recently by the Petroleum Minister⁴³ for the financial years 2016/2017 and 2019/2020. These support OME's projections.

The ‘proactive scenario (PS)’ allows for renewables penetration and impact of demand management measures, like energy efficiency and conservation, now being implemented in Egypt. The ‘conservative scenario’ does not – it assumes, conservatively, that gas demand carries on increasing unabatedly.

Fig 8 Egypt's gas balance



Source: Sohbet Karbuz, Observatoire Meditteraneen de l' Energie, OME, PRIO conference, Nicosia, November 2016

Either way, gas surplus for export could reach 20-35 bcm/yr by 2030, and possibly more. This will more than fully utilize the existing liquefaction capacity of Idku and Damietta LNG plants. The combined capacity is 17.5 bcm/yr. Egypt will stop importing LNG by 2018 and will not require long-term gas imports.

Demonstrating his confidence that Egypt will achieve self-sufficiency by the end of 2018, and is well on the way to have more gas than it needs for domestic consumption, Petroleum Minister Tareq El Molla said in December 2017 that the country would allow IOCs operating there to export surplus natural gas in five years. Going further, he stated that this provision is now added to E&P contracts. These contract changes, not only demonstrate confidence that gas production will grow in the future, but are also part of Egypt's larger strategy to become a regional energy hub.

The key conclusion is that Egypt has enough gas to cover domestic consumption and resume LNG exports.

7.3 Regional market: Italy

Italy approved in November 2017 its National Energy Strategy to 2030⁴⁴. It intends to phase-out coal by 2025 and some of this capacity will be provided by gas – but most by renewables. It consumed 67.5 bcm gas in 2015, but produced only 6.8 bcm, with indigenous production still declining. This may increase to 72 bcm/yr by 2030, making Italy the third-largest gas market in Europe.

With Italy's high dependence on gas, the security and resilience of the gas system, including storage, interconnections and diversity of supplies, are a priority for Italy.

Italy's dominant gas supplier is Russia, with about 41% share in 2016, followed by Algeria, Libya, the Netherlands, Norway and Qatar. Some of these supplies are considered to be risky, or contracts are coming to an end during the next few years. In this respect 2019 may turn out to be a critical year. As a result, the Energy Strategy is promoting new gas import pipelines to diversify supply.

These include the TAP pipeline supplying gas from Azerbaijan, currently under construction, and the EastMed gas pipeline proposed to import gas from the Eastern Mediterranean. TAP, with 8.8 bcm/yr for 25 years, could meet 13% of Italian gas demand when it arrives. However, given the commercial challenges EastMed faces, it will be interesting to see if it ever becomes reality – a hefty EU subsidy will be needed to achieve this. Another possibility is LNG from Egypt using gas from Zohr. ENI has already received dispensation in Egypt to supply gas to Italy, once domestic demand has been satisfied.

The Energy Strategy⁴⁴ also states that pipelines may be complemented by new projects promoted by Russia in order to avoid transit through the Ukrainian route, such as doubling the Nord Stream pipeline, and route diversification provided by the TurkStream pipeline - with one of the two lines earmarked to transport Russian gas supplies to Europe from the south.

It is quite likely that some Egyptian LNG will end up in Italy.

8. IMPACT ON EAST MED GAS

The East Med region is geopolitically volatile. Developing and exporting its gas is a challenge, especially in the prevailing low price environment globally.

Oil companies operating in the region are aware of these challenges. But they work on horizons of 40+ years. So they can wait before proceeding with any project until risks are acceptable, it becomes financially viable and when the financial returns meet their own goals.

However, for self-explanatory reasons, the horizons of East Med countries are much shorter. They need to reap the benefits of hydrocarbon reserves as soon as possible for the benefit of their economies. This is especially so for Cyprus following the economic crisis of 2013. A

climate of expectation has been created that the proceeds from the sale of gas will solve the economic problems of the island. But of course this is not in the hands of Cyprus. There is a degree of disconnect between local expectations and the reality of global markets that needs to be bridged through management of such expectations.

Natural gas sales depend entirely on global markets and prices. And with the high cost of producing and exporting gas from the East Med this is quite challenging. These are the reasons why so far Cyprus and Israel have been unable to find buyers for their gas.

Regional markets such as Egypt, Turkey and Italy are options, but quite challenging.

East Med plans need to be tempered with a dose of reality. The world is awash with gas and LNG and with US shale on the resurgence, and renewables penetration unstoppable, competition to secure markets will be fierce. Prices are low and will stay low.

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Units

bcm	: billion cubic meters
mmBTU	: million British thermal units (approx. 1000 cubic feet gas)
MMtpa	: million tons per annum
tcf	: trillion cubic feet

10. AUTHOR CV

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He has over 35-year experience in the oil & gas sector in senior management positions. Currently, he is CEO of e-CNHC, providing management and advisory services in the oil & gas and energy sectors in Cyprus and the SEE region. Prior to this, as CEO of Cyprus Hydrocarbon Company (KRETYK), he was responsible for implementing Cyprus's strategy for the development of its hydrocarbons sector. Until 2012, he was a Director of Mott MacDonald for 25 years and the Managing Director of Mott MacDonald's Oil, Gas & Petrochemicals business worldwide.



Charles has participated on several occasions at IENE conferences and Workshops and has contributed analysis on hydrocarbon issues related to the East Med. He is currently an external Senior Research Associate of IENE based in London.