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GAS IN CYPRUS: OPPORTUNITIES FOR DUTCH BUSINESS & KNOWLEDGE INSTITUTIONS

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1. Executive Summary

Since the discovery of the deep water gas fields in Israel (Leviathan, 2010), Cyprus (Aphrodite, 2011) and more recently the Zohr Field in Egypt waters (2015), there is growing international interest in exploration activity in Cyprus. With a total of 13 blocks available for licensing in the EEZ of Cyprus, 8 blocks are now licensed with involvement of major IOCs (ENI/KOGAS, Total, Exxon Mobil/Qatar Petroleum and Shell). Within the next 1-2 years Cyprus could be on the verge of having multi Tcf (trillion cubic feet) gas discoveries in deep water with the need for gas export facilities, a deep water pipeline system, marine/port infrastructure and related services. The challenges will be many as well as the opportunities for Internationally focused players in the sector.

This document is the result of an initiative of the Dutch Embassy of Cyprus to review and identify opportunities for Dutch businesses' in the development and exploitation of Natural Gas in offshore Cyprus and more broadly in the Region. Specifically the document is structured to provide answers to the following key questions:


- Section 2.2/2.3-What is the history of offshore gas activities in Cyprus and how is it organised & regulated?
- Section 3-What are the prospects for Natural Gas in the Region?
- Section 4-What is the current status and way forward for the offshore exploration activities and what are the prospects for exploitation. What are the key challenges and needs of Cyprus to be a successful gas exporting country?
- Section 5- What does the Natural Gas Sector of The Netherlands have to offer (Cyprus) and how can it make that offer?

This review highlights opportunities for Dutch Business in the whole value chain of gas from exploration to gas sales with special attention to:


- Upstream and downstream support (design/engineering, facilities etc)
- Marine & Port services support
- Professional services support
- University/R&D/Training & development
- Assistance to the Government of Cyprus (GoC) and wider EU collaboration

The main conclusions are:

1. The gas potential in the deep-water basins of the Eastern Mediterranean is being realized with recent discoveries in Israel, Egypt and Cyprus. Licensing of offshore blocks is also now underway.
2. Egypt has a mature offshore sector with many active companies, a large domestic gas market and existing gas export infrastructure (2 LNG terminals); Israel has large discoveries, ongoing gas production and further field development underway but requires gas export markets and infrastructure if its offshore sector is to develop further; Cyprus has one discovery and is in need of more discoveries to establish viability of gas export infrastructure and avoid being overly dependent on its neighbours.
3. Cyprus is, however, in the enviable position in attracting large IOCs (ENI, Total, ExxonMobil/Qatar Petroleum and Shell) to its EEZ with a multi well exploration drilling programme for the coming 3 years. Their aim is to build on the success of the ENI discovery in the deep-water of Egypt (Zohr is located some 6 kms from the EEZ median line between Egypt and Cyprus. Should one or more of these wells discover multi Tcf gas (>5 Tcf) then one should expect Cyprus to move to install its own gas export infrastructure (LNG terminal). This will herald a new era for Cyprus, the region and for Europe.
4. Exploration activity offshore Cyprus includes:
 - Total/ENI drilling mid 2017 block 11

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- ENI/Total drilling 2 wells end 2017 block 6
 - ExxonMobil/Qatar Petroleum conducting 3 D seismic in Block 10 with a multi well drilling programme planned for 2018/2019 +.
5. Exploration success in Cyprus would mean many opportunities for Dutch Business to provide services and support in the following areas (details summarised in Section 4.7/4.8):
- Support to the Upstream and Downstream developments
 - Support to the development of port/marine infrastructure required on the Island
 - Professional services for the offshore sector and related sub-sectors
 - Collaboration/support to Universities/R&D institutions and provision of training/L&D.
 - Collaboration at the Government level (NL: CYP) as well as wider EU collaboration
6. Exploration failure in Cyprus would not necessarily be the end game but the pace and risks would be different and Cyprus offshore developments would be more dependent on the success of Egypt and Israel

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2. Natural Gas Activities in Cyprus

2.1. Cyprus Energy Supply/Demand

In Cyprus, energy constitutes one of the most important sectors as far as the economy is concerned. The Cyprus energy sector is characterized today by a high dependence on imported sources of energy, the dominance of petroleum products in the energy mix, the lack of interconnections with the European networks, and also the need for more renewable energy.

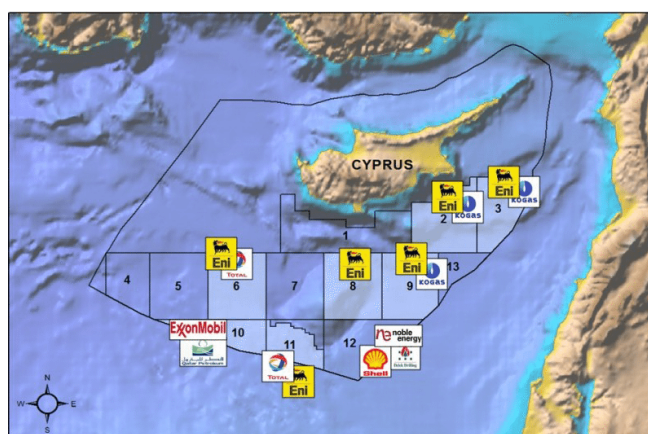
The total energy demand of Cyprus in 2014 was some 1.6 mln toe (equivalent to ca 1.8 bcm natural gas) of which some 94% is supplied by petroleum products and the remaining 6% is met by renewable energy sources (RES). The main users of the petroleum products are the transport sector and the power generation sector. The power sector consumes about 0.6 mln toe/yr oil (equivalent to ca 0.5 bcm/yr natural gas).

In 2011, Noble Energy and its partners drilled the first offshore deep water well in the Cyprus EEZ and discovered some 4.5 Tcf gas (125 bcm). The offshore gas discovery, named Aphrodite, remains undeveloped pending a viable export market given the limited size of the domestic market.

The scope for fuel substitution to Natural Gas is mainly the power generation sector, cement and water desalination. A report issued by the International Renewable Energy Agency indicates that renewable energy could provide 25% to 40% of Cyprus' total electricity supply by 2030 with solar PV the dominant source and wind energy being the second most important.

2.2. History of Exploration in Cyprus

The offshore activity began in 1988 when Cyprus decided to apply the UNCLOS law of the sea Convention and agree boundary limits to its Exclusive Economic Zone with its surrounding neighbors (Israel, Egypt and Lebanon). To date the GoC has conducted 3 licensing rounds and licensed the following blocks:



First Licensing Round (2007):

- Block 12 (2007) - Noble Energy, currently 35% Operator in partnership with Delek 30% and Shell 35%. Drilled 2 wells, the first of which discovered the 'Aphrodite' gas field (Dec 2011) and the second well was an appraisal of the discovery. According to independent third party assessments the mean contingent resources are ca 4.5 Tcf (125 bcm). The Partners declared commerciality in June 2015 but development is pending a viable gas export option and Gas Sales Agreements.

Second Licensing Round (2012):

- Block 02 (2013)-ENI/KOGAS (80/20%);
- Block 03 (2013)- ENI/KOGAS (80/20%);
- Block 09 (2013)-ENI/KOGAS (80/20%); Drilled one well in September 2014 and another in January 2015 with both wells failing to discover commercial quantities of hydrocarbons.
- Block 10 (2013)-Total relinquished the block in 2015 following poor results from Block 9
- Block 11 (2013)-Total has conducted geological and geochemical surveys in the area to further evaluate the prospectivity of the Block and plans to drill its first well mid 2017. ENI has farmed into Block 11 (50%).

Third Licensing Round (2016):

- Block 6 ENI/Total (50/50%)-ENI Operator
- Block 8 ENI alone
- Block 10-Exxon Mobil –Operator (50%) and Qatar Petroleum (50%)-this is the block previously licensed to Total but relinquished (following the failure of ENIs wells in Block 2.

Typical features of the Aphrodite discovery are shown below with a comparison of deep-water discoveries in Israel and Egypt:

	Cyprus	Israel	Egypt
Number of License Blocks and area, km2	13 blocks, 3000-7000 km2/block, Total extent >51000 km2	69 blocks, 120-410km2/block	Some 8 blocks from 1500-4000 km2/block
Range of water depths	Up to 3000 (Aphrodite discovery 1700 m)	800-1800 m (Leviathan discovery 1650 m)	>1500 m (Zohr-1450 m)
Partners	Noble Energy (35%); Delek/Avner (30%); Shell (35%)	Noble Energy (39.7%); Delek/Avner (45.3 %); Ratio (15%)	ENI (60%)/BP (10%)/Rosneft (30%)
Discovery features	Aphrodite (2011): Reservoir depth 5860 m measured depth; recoverable volumes 4.5 Tcf (125 bcm); sandstone formation; distance from CYP coast 185 km	Leviathan (2010): Reservoir depth 5230 m measured depth; recoverable volumes 20 Tcf (570 bcm); sandstone formation; distance from ISR coast 130 kms	Zohr (2014): Reservoir depth 4150 m; recoverable volumes 30 Tcf (850 bcm); carbonate formation; distance from shore some 190 km and distance from Aphrodite, CYP 90 kms
Development Plans	Project not yet sanctioned-pending GSA/FID	Leviathan phase 1 sanctioned-gas to Israel/Jordan 2019, capex \$3.75 bln	Fast track development under way with first gas 2017/2018 to Egypt. Capex \$4.4 bln to bring the field on stream

2.3. How the Exploration/Exploitation Activities are Organised and Regulated

The hydrocarbon exploration and exploitation activities in Cyprus are governed by the Hydrocarbon Law of 2007 covering Prospection, Exploration & Exploitation (Law nr. 4(1)/2007) and the Hydrocarbon Regulations of 2007 and 2009 (nr. 51/2007 and 113/2009). The legal framework applies to the territorial waters, the continental shelf and the Exclusive Economic Zone (EEZ) of Cyprus. Hydrocarbon activities are subject to general Cypriot laws and regulations on environmental protection, health and safety. The European Union Directive on the conditions for granting and using authorisations for the prospection, exploration and production of hydrocarbons (directive 94/22/EC) and other relevant EU legislation applies to oil and gas activities in Cyprus.

In 1988 Cyprus ratified the United Nations Convention on the Law of the Sea (UNCLOS 1982). Maritime boundaries have been delimited and agreements have been signed between Cyprus and its neighboring countries-Egypt, Lebanon and Israel. Egypt and Cyprus have also agreed and signed a Framework Agreement regarding cross median line hydrocarbon resources. The Lebanese government has yet to ratify the maritime boundary agreement with Cyprus, as there is a dispute between the southern boundary between Lebanon and Israel in the location where it meets the Cyprus boundary.

Cyprus petroleum regulations are based on a production sharing contract (PSC) system where the terms are negotiated before a license is awarded and therefore vary from license to license. The generic PSC terms and conditions are published on the website of the MECIT.


The **Council of Ministers** (below) is the executive branch of the Cypriot government. The Council is chaired by the President of Cyprus and the Ministers head executive departments of the government. The President and his Ministers administer the government and the various public services.

Office	Name
President	Nicos Anastasiades
Minister of Foreign Affairs	Ionnis Kasoulides
Minister of Finance	Harris Georgiades
Minister of Interior	Constantinos Petrides
Minister of Defence	Christoforos Fokaides
Minister of Education & Culture	Costas Kadis
Minister of Communications & Works	Marios Demetriades
Minister of Energy, Commerce, Industry & Tourism	George Lakotrypīs
Minister of Agriculture, Natural Resources & Environment	Nicos Kouyialis
Minister of Labour & Social Insurance	Zeta Emilianidou
Minister of Justice & Public Order	Ionas Nicolaou
Minister of Health	George Pamborides
Government Spokesperson	Nicos Christodoulides
Undersecretary to the President	Vasilis Palmas

Ministry in Charge of oil/gas affairs, Ministry of Energy, Commerce, Industry and Tourism (MECIT)

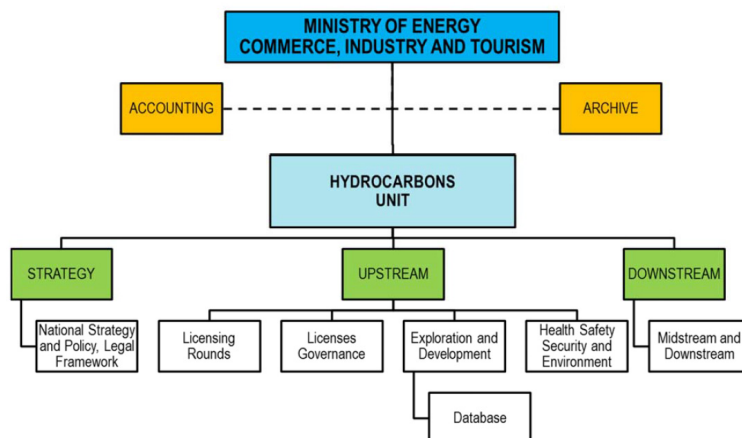
The Ministry of Energy, Commerce, Industry and Tourism (MECIT) is responsible for the formulation and implementation of Government policy on matters pertaining to offshore exploration/production, trade, industry, tourism and Consumer. The offshore Exploration/Exploitation activities are managed/governed by MECIT through its Energy Services Group of which one part is the Hydrocarbons Unit (see below). The Energy Services Group has overall responsibility for:

- Monitoring and coordinating the supply and availability of sufficient energy capacity for domestic needs.
- Monitoring and participating in the formation of the European Policy for energy issues.
- Suggesting ways for the implementation of the European Acquis, assists in the preparation of Laws, Regulations, Rules etc and implements programmes for their promotion.
- Preparing and implementing programmes for energy conservation, the promotion of renewable

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- energy sources (RES) and the developing of technologies for the utilization of RES
- Assisting the Government in the formation of the national energy policy for Cyprus in coordination with all other bodies involved.

The structure of the Hydrocarbons Unit is shown below (not all elements are currently in place):



National Company- Cyprus Hydrocarbons Company-established as a legal, private entity under 100% control of the Government to manage the State's interest in the chain of hydrocarbon production. The CHC has a functioning Board and Management. The CHC performs on behalf of the GoC and in line with the policy defined by the Council of Ministers aspects of the PSCs and has responsibility for the marketing and sale of the GoC's entitlement to hydrocarbons. Furthermore, CHC acts as an observer in the operating or management committees established under the PSCs and participate in the discussions on export options. They use Lloyd's register as advisors. CHC is currently leading participation in the negotiations with the Egyptians regarding the Aphrodite gas sales.


Ministry of Foreign Affairs (MFA)

The MFA plays an active role in the activities of the offshore sector due to their strategic importance to the Country. There is a standing Ambassador responsible for Energy who participates in bilateral relationships, unitisation issues and the issue of Turkish threats to prevent the ongoing exploration/exploitation activities until there is a solution to the Cyprus problem.

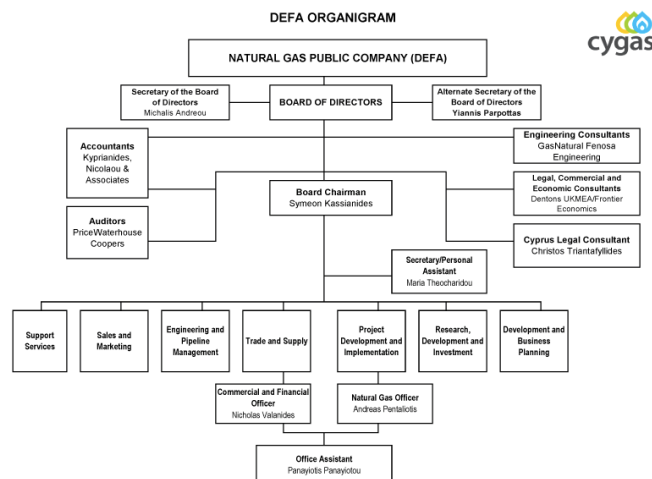
Natural Gas Public Corporation-DEFA

In November 2007, following a relevant Decision of the Council of Ministers, the Natural Gas Public Corporation (DEFA) was founded as a private legal entity, with the Government of Cyprus as its sole shareholder. DEFA's mission is to:

- To secure sufficient Natural Gas supplies for the Island, at the lowest possible prices, to cover the needs for Electricity Power Generation (Phase "A") and subsequently to also supply industries, hotels and households.
- To develop the necessary gas network infrastructure. □ The gas network will initially consist of 3 pipelines connecting the Gas Import Hub with the three existing downstream Power Stations. Initially, this network (total length is 80 km) will consist of three pipelines that will supply the three Power Stations of the Electricity Authority of Cyprus in Vasilikos, Dhekelia and Moni. The estimated cost for "Phase A" of this project is around €60m. Towards this cost DEFA has

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managed to secure a €10m grant from EU under the European Economic Programme for Recovery.



Ministry of Agriculture, Rural Development and Environment

The Ministry advises on environmental policy and coordinates programs for the environment. It supervises the implementation of policy and the adoption of European policy and legislation on the environment. Moreover, the department chairs of the Committee for Environmental Impact Assessment, promotes, among other things, the enforcement of laws relating to the Control of Pollution of Water and Management of Solid and Hazardous Waste and encourages environmental awareness and information.

CERA

The Cyprus Regulatory Authority for Energy (CERA) was established in 2003 in accordance with EU directives. It is the National Independent Energy Regulatory Authority and, on the basis of its powers, oversees and regulates the electricity and gas market, ensures effective and healthy competition, protects the interests of consumers, ensures safety, quality, adequacy, continuity, reliability in energy supply, and also encourages the use of Renewable Energy Resources.

Geological Survey


The Geological Survey Department is the technical advisor to the State for all geological matters. In particular, it is the governmental agency responsible for conducting investigations and studies, and providing advice on geological, hydrogeological, geotechnical, geology, geophysical, seismological and geo-environmental issues.

Ministry of Transport, Communications and Works

The design and implementation of policies for the continuous improvement of transport (air, maritime and land) and of communications, as well as the continuous upgrading of the quality of projects implemented by the Ministry. They are responsible for: Merchant Shipping; Road transport; Electronic communications; Antiquities; Civil Aviation and Public Works.

The Cyprus Port Authority (CPA)

The CPA is a Public Sector Entity set up by law (1973) and governed by a nine-member Board (Chairman, Vice-Chairman and seven members) appointed by the Council of Ministers for a three-year term. The Board applies the policies of the Government according to the Authority's legislation. The CPA is supervised by the Minister of Transport, Communication and Works. The CPA is the competent entity to administer, operate and develop the ports, as well as to facilitate international shipping aids

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and issue licenses for pilotage. The Authority has a dual role in exercising public power and providing commercial and financial services. In its public power role, the Authority is the owner of the ports and lighthouses as well as being the regulator of port services rendered, including:

- Plans, develops and manages port infrastructure.
- Provides licenses for the use of port land, and the provision of services in the ports under its jurisdiction.
- Provides licenses for the provision of port services and for the construction of works in port areas.
- Provides public/non financial activities.

As well as the above role, the Authority provides commercial/financial/port services:

- Ship pilotage
- Ship towage and mooring
- Use of gantry cranes and large mobile cranes
- Reception, storage and delivery of cargo

Within the jurisdiction of the Authority are the commercial ports of Limassol and Larnaka and a host of minor ports & lighthouses around the Island.

The installations of Limassol and Larnaka ports have quays of 1980 metres and 866 metres respectively. At the same time, the open stacking area at Limassol port is some 490.000 sq. metres, while that of Larnaka port is some 220,000 sq. meters.


Ministry of Education

The Ministry directly governs all aspects of primary and secondary education. Cyprus has a number of publicly funded and private funded universities offering both undergraduate and postgraduate qualifications. In total some 20000 Cypriots study abroad at universities abroad and some 25000 study at the Cyprus universities. Cyprus attracts some 10000 foreign students to study in Cyprus. Of the 3 public funded, the oldest is the University of Cyprus (UCY) in Nicosia established in 1989. Although newly established, UCY has managed to become the leading educational institution in Cyprus and one of the most respected institutions in the Mediterranean, hosting today more than 7.000 students, 1.327 academic and administrative personnel, and 20.000 alumni. Approximately, 1.300 undergraduate students are admitted to the University of Cyprus every year. The other 2 are the Cyprus University of Technology (CUT, est. 2003) in Limassol and the Cyprus Open University (est. 2002).

Technical/Engineering courses offered relevant to the oil & gas sector include:

- Undergraduate-basic sciences (Physics, Chemistry, Mathematics); Civil and Environmental Engineering; Electrical Engineering; Mechanical Engineering, Computer Engineering and Informatics
- Postgraduate programmes cover Masters & Ph.D in Civil and Environmental Engineering; Masters in Energy Technologies and Sustainable design; Masters in Petroleum Engineering (1 set of students). In total there are some 120 engineering postgraduate students at the UCY.

There also a number of private universities licensed to operate in 2007-Frederick University, European University-Cyprus, and University of Nicosia. In 2011, 2 more were licensed-Neapolis University, Paphos and University of Central Lancashire. Frederick University is the only university offering a bachelor's degree in mechanical engineering with specialization in oil & Gas engineering and oil & gas offshore engineering (Masters).

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In 2015 a Maritime Academy was launched in Larnaca, Cyprus offering courses in shipping & Logistics Management, Maritime transport, Marine Engineering and Marine Electrical technology

Private Institutions of Tertiary Education

The Private Institutions of Tertiary Education (PITE) were established mainly during the last two decades. They are non-university institutions of Tertiary Education, offering a wide range of academic and professional programmes of study from one vocational courses to PH.D level research programmes in Business Studies; Education; Engineering; Social Sciences; Compute Science; Hotel and Tourism and Music.

Joint Rescue Coordination Center (JRCC)- Cyprus has established the **Joint Rescue Centre in Larnaca**: Their Primary mission is to organize the Cyprus Republic Search and Rescue system (SAR) in order to be able to find and rescue in the least possible time people whose lives are threatened as a result of an air or naval accident in its area of responsibility. The JRCC is an independent agency under the Ministry of Defense with the Minister being responsible for its operational aspects. The JRCC is able to manage a complete surveillance, location, identification, prevention, command and control system, covering the maritime area of responsibility and jurisdiction of the Republic of Cyprus in Eastern Mediterranean, serving, also, as a Coordination Centre for Humanitarian Operations due to natural or other disasters. They conduct joint training exercises with Egypt and Israel.

The Cyprus Research Institute

The Cyprus Research Centre (C.R.C.) was founded in 1964 with the aim of enabling Cypriot and overseas scholars to research the history and civilisation of Cyprus and having the conclusions of the relevant research published on a systematic basis. Research programmes relevant to the fundamental disciplines of the culture of Cyprus, namely its history, folklore, language, literature, ethnography and social sciences are initiated and implemented at the C.R.C. as well as those concerning related disciplines, according to the country's requirements at any given time and within a broader regional context.

Oceanography Centre in the University of Cyprus

The Oceanography Centre University of Cyprus (OC-UCY) research activities include numerical models (flow, oil spill and general pollutant dispersion and sea state predictions), satellite remote sensing, remote in-situ monitoring (buoys, gliders, drifters, multi-parametric probes, floats), hydrography (both physical and chemical), biological oceanography, data and metadata management and operational oceanographic forecasting and monitoring.


PWC-has established an oil & gas group with 11 full time working professionals (30% time writing) and an additional 20 professionals currently undergoing training. They cover issues related to accounting and tax as well as general Consultancy in the sector.

Upstream Companies/IOCs;

Noble Energy

Noble is actively engaged in the Israeli EEZ (through its Leviathan development and producing Tamar et al assets) and the Cypriot EEZ (through its Aphrodite discovery). They are currently investing over \$3 bln to bring Leviathan on stream by 2019 and are negotiating with Egypt for the sale of Leviathan Phase B gas and Aphrodite gas. Shell is now a partner in Aphrodite through their purchase of BG (who farmed into Aphrodite in 2016).

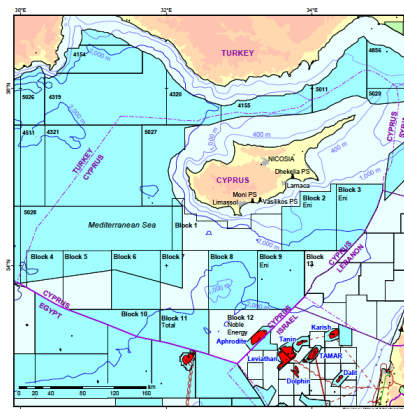
TOTAL-This company is enthusiastic about the prospects for finding Zohr like structures but are of the firm opinion that export development will be part of 'joint' undertaking with the other companies already in Cyprus.

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ENI-The most committed of the Operators to Cyprus. They are there for the long term. They have major interests in 6 of the 8 blocks licensed to date as well as major upstream and downstream interest s in Egypt. Their position on export infrastructure (pipelines versus LNG) will be paramount in any decision making on the issue. They are active in providing training for staff of MECIT. They see the deep water plays of the East Med as important in providing an 'energy bridge' to Europe.

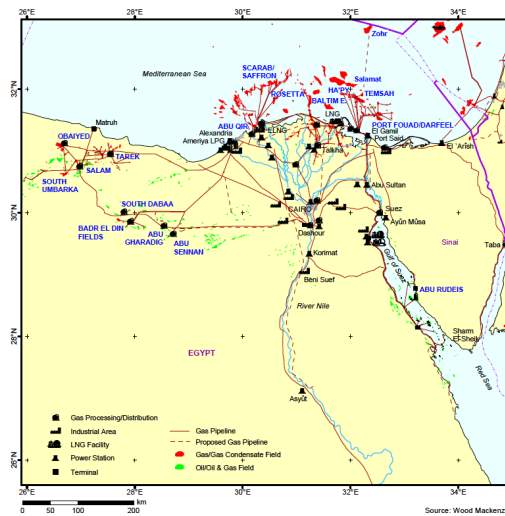
ExxonMobil/Qatar Petroleum, XOM/QP-A new player to the East Med. XOM/QP has ownership of Qatar LNG, one of the largest LNG exporters in the world. XOM/QP must view the East Med as a European play given their large Mid East interests. They do not have upstream or downstream interests in Egypt.

3. Natural Gas Activities in the Region



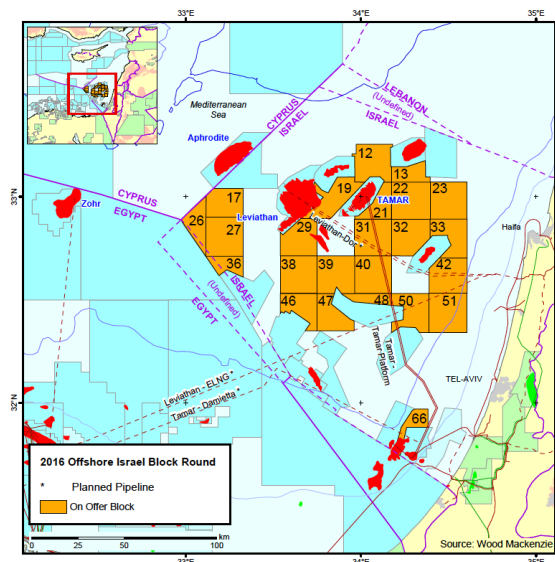
In 2010 the US geological Survey estimated undiscovered oil and gas resources in the East Mediterranean Region (covering hydrocarbon basins of Lebanon, Cyprus & Israel) could be in excess of 350 Tcf (10 Tcm) gas and 3.5 billion barrels oil. Out of 219 hydrocarbon provinces assessed by the USGS, the estimated mean of undiscovered gas resources in the Levantine Basin puts it in the top ten of most promising gas provinces in the world. Discovered gas resources in the Levantine basin (Cyprus, Israel, Egypt deep water) to date, amount to over 90 Tcf (2.6 Tcm) with Israel accounting for some 40 Tcf (1Tcm).

Egypt-Egypt onshore and offshore exploration and production activity is well developed. Currently, there is a current boom in the Egyptian gas market with many discovered being made since the government improved the fiscal terms and allowed gas prices to increase thereby promoting exploration activity. The proven gas reserves of Egypt are some 65 Tcf (1.8 Tcm) (2016 BP Annual Review).




The discovery of the giant Zohr gas field in August 2015 (by ENI), is a major new East Med discovery (located in new miocene carbonate play) with estimated reserves exceeding 30 Tcf (850 bcm). This discovery has been the catalyst for the success of the the 3rd Licensing Round in Cyprus given that Zohr is located some 6 kms to the south of the Egypt-Cyprus median line.

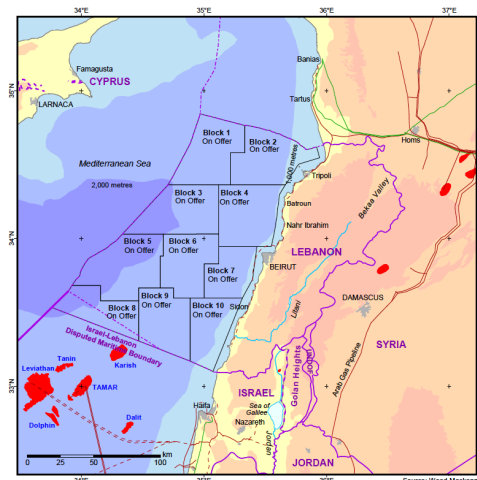
Israel-some 450 wells have been drilled onshore and offshore Israel in the period 1955 -1995. Commercial gas quantities were found offshore in 1999 and date some 40 Tcf (>1 Tcm) has been discovered in water depths ranging from 235 m to 1700 m.



A study by Becip Franlab of France estimates that some 6.6 bln bbls oil and 74 Tcf (2 Tcm) gas are yet to be discovered. In November 2016 Israel initiated its first offshore licensing round with a closing date of July 10 2017. Some 24 blocks are on offer with the most prospective being the ultra deep water near the discoveries of Leviathan and Tamar. On the export side Israel and its partners (Noble/Delek) have been discussing pipeline export to both Egypt and Turkey. These discussions drag on but indications are that a decision on the possible pipeline to Turkey option will be made by end 2017.

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Lebanon-Lebanon appears to be closer to finalizing the bidding round of its first Offshore Licensing Round. This process was initiated in 2013 when it announced the prequalification for companies to participate in the First Offshore Licensing Round. The results of the prequalification were announced on the 26 April 2017 and the approved companies will be invited to submit bids for blocks 1,4,8,9 & 10 shown below by 15 September 2017. Getech (wholly owned subsidiary of ERCL) is advising the Lebanese Petroleum Authority. Water depths range from 400-1500 metres. Although the potential for discoveries is relatively high, Lebanon suffers from a lack of infrastructure as well as the geopolitical instability of the area.



Turkey-Turkey has limited domestic oil and gas production and imports over 90% of its oil and almost all natural gas. Turkey has a growing gas demand and currently imports gas from Russia and Qatar. Turkey is interested to diversify its sources of Natural Gas.

4. The Status and Way Forward for Natural Gas in Cyprus

4.1. Cyprus Exploration Activity


Given the success of the 3rd Licensing round, the coming 3 years of exploration activity in the EEZ of Cyprus is secure. The scope includes:

- Total to drill one exploration well mid 2017 (seeking Zohr look-alike structures)
- ENI/Total to drill 2 wells back to back in Block 6, 2017/2018
- XOM/QP-conducting 3D seismic campaign in Block 10 with aim of drilling 2018/2019

4.2. Cyprus Exploitation Activity

The way ahead for development of the Aphrodite field is a decision principally made by Noble and its partners (over which the GoC has influence and must ultimately approve). The Aphrodite field is under active negotiation with Egypt for pipeline gas export, however, no final agreement (Gas Sales Agreement) should be expected before 2018/19 (if it comes at all). If a GSA is signed, the field development will take some 3-4 years so first gas should not be expected before 2023 (Appendix 1).

Any Gas Sales Agreement for Aphrodite will be impacted by multi Tcf discoveries (eg >5Tcf) made in the coming 1-3 years. Such discoveries would expedite the decision for an LNG Terminal on the Island but would complicate the ongoing negotiations with Egypt. Depending on volumes discovered (if any), committing gas sales to Egypt from Aphrodite may negate the LNG export option that requires some 8-10 Tcf recoverable volumes for viability. Although Noble is the Operator of the Aphrodite field and more senior partner, their main Israeli partner, Delek/Avner (one company), is known to prefer pipeline export to Egypt and Turkey and is not in favour of an LNG Terminal on Cyprus

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The Total company is of the view that long term gas exports from Cyprus will be determined by 2 key groups: XOM/QP and ENI/Total. They see 2025 for first gas (exports).

4.3. Possible impact of Israeli Offshore Activity

The Tender results for the Israeli First Licensing Round Blocks are not expected before mid 2017. Exploration will then take place over 3-5 years. Israel is having difficulties attracting major IOCs to its offshore sector.

On the field development side Leviathan A will come on stream ca 2019. The Leviathan partners and the State of Israel are in active discussions for gas sales of Leviathan B with both Egypt and Turkey (who are equally 'hungry' for more {cheap} gas). A deal with Turkey would trigger political issues with Cyprus as it raises the prospect of Israel/Turkey having to lay a pipeline through the Cyprus EEZ.

4.4. Possible impact of Zohr development

Development of Zohr by ENI and its partners is well underway with first gas expected 2018/9. This will 'pressure' gas sales discussions with the Cypriots and Israelis as their gas will have to compete on price.

4.5. Possible impact of Lebanon Offshore Activity

The Government of Lebanon is set to announce the winners of the 5 blocks on offer by September 2017. This will be the first indication of success or failure and whether exploration activity can pick up in the coming years. The chance of success of this License Round is not helped by the fact that the First Round blocks are neither the most 'technically' interesting and are located in areas where the boundary lines are contested by Israel (blocks 8,9 &10).

4.6. Imported LNG for the Power Generation Sector

After several attempts to import LNG for power generation (NOTE-Cyprus currently generates its electricity from liquid fuels), DEFA is now directed to rework a new Tender without linkage to the potential gas production from offshore gas discoveries. The contractual period for the LNG supply is to be extended, thereby improving the viability for potential bidders.

4.7. Issues and Challenges


The key issues and challenges facing Cyprus to explore and develop the Natural Gas include geo-political, economic/commercial and technical as summarized below-focus is on the techno-economic issues:

Political issues: The number 1 issue:


1. Will Turkey allow continued Exploration and Field development to proceed without a solution to the Cyprus problem or guarantees for the revenue sharing with Turkish Cypriots? It is easy to see why Turkey should allow Exploration to continue as it is in their interests as well as the GoC to have a better understanding of the potential resource volumes) but field development is another level of commitment.
2. Should Israel and its partners agree to export gas to Turkey from Leviathan B this will almost certainly have to cross the Cyprus EEZ. This would be contentious although legally possible,

Economic/Commercial/Technical/Capacity:


3. Cyprus needs further discoveries/resource volumes if it is to develop its own export infrastructure. Without additional resource volumes, Cyprus will be dependent on those countries with larger resource volumes and existing export infrastructure who will dictate the terms for export (Egypt).

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4. Exploration and Exploitation of the Cyprus EEZ will require deep-water technology (drilling and production systems) heavy lifting/pipe laying facilities and extensive marine based support. This is an area where The Netherlands has much to offer.
5. Development infrastructure:
 - a. The Port facilities and capacity are not set up to 'service' increased offshore activity levels and this must be resolved to avoid bottlenecks and potential relocation to other countries who have the capacity (NOTE-the Aphrodite field is almost equidistant from Israel, Egypt and Cyprus). The MECIT have prepared a Master Plan for Vasilikos to become the main industrial port of Cyprus-this needs to be delivered. The CPA is in progress considering how to privatize and offer itself as a 'Landlord' as opposed to 'port operator'.
 - b. **Vasilikos** –the needs are numerous for Vasilikos to become the industrial port (handling 'dirty' cargo) of Cyprus-this includes the export facility (LNG trains), oil storage terminal, LPG storage and possible gas based industries; Cement works; LNG jetty and berths; LPG berths; bitumen berth and a spur off the existing VTTV jetty to provide additional oil import capacity if needed.
 - c. **Onshore operational bases**-as drilling and field development activities are expanded, a number of onshore bases (Marine Supply bases) will be required. Aphrodite will require dedicated onshore facilities to support the offshore activities related to drilling, completions and field development/operations. The onshore support should be centrally located, have adequate open and covered space for storing, servicing, repairing and securing necessary equipment. Additionally, it is important to have adequate office facilities within the space area to lend engineering and operational support. The design, construction and operation of these supply bases is a major requirement for a successful management of offshore activities and this is an area where Dutch expertise has a lot to offer.
 - d. **Cyprus shipping**-Cyprus is an established international maritime centre combining both a sovereign flag and a resident shipping industry. The discovery of hydrocarbons places new challenges on the Cyprus shipping industry and creates new prospects with the potential to develop into an energy centre for the East Med. The offshore sector requires specialized ships and equipment. Cyprus is looking into the option for offshore LNG bunkering as well as a transshipment centre for the Europe-Far east trade. To fulfill this potential Cyprus will need to upgrade its key infrastructure facilities. It has already initiated port privatization.
6. The GoC/MECIT is organized to handle a limited amount of offshore activity, however, governance of the sector is weak and unable to cope with additional demands from increased activity levels. There needs to be clear demarcation between MECIT as Regulator and the CHC acting on behalf of the GoC.
7. There are issues around the regulations and fiscal aspects of the PSCs. One issue not adequately covered is that of unitization-it is mentioned as a requirement in cases of reservoirs crossing license boundary lines but it offers neither prescriptions nor a framework to resolve. Cyprus would benefit from the way this is treated in the Netherlands where it is resolved as a condition of the license. The GoC should provide a framework covering the EEZ of Cyprus. The issue of unitisation of Aphrodite with Israel is an issue that 'festers' and has still not been resolved after several years of negotiations. This should be resolved prior to any major decisions on Aphrodite field development. Noble Energy believes that development of the Aphrodite field can go ahead without a unitisation agreement with the Israelis (probably because they see the amount of potential gas on the Israeli portion as too small to be of commercial significance)

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8. For Cyprus to become an Energy hub for the East Med, it will need a credible, well-connected and reliable export system with storage facilities to allow effective trading and buffering in times of emergencies. This desire can only be fulfilled through collaboration with its neighbours. Such collaboration includes sharing onshore and offshore facilities & infrastructure, services for emergency response, conducting joint environmental monitoring of the East Med etc.
9. The issue of Finance availability for the midstream (eg LNG Terminal) is less serious (than in the past) given the 'weight' of players in the Cyprus sector. What is less certain is the degree of collaboration on decision taking that will be required by the Upstream players and how this will be affected by the different conflicts of interests between them (eg Noble Energy/Delek interest in Leviathan will frustrate decisions on Aphrodite and export options (it is a known fact Delek prefers pipeline export to Egypt and Turkey); ENI and Shell have interests in the LNG facilities in Egypt and this will conflict with the GoC wishes to have an LNG Terminal on the Island).
10. Cyprus needs a (long term) transformation plan for its economy as a whole as a result of a successful offshore gas sector. This should look at the whole economy and the specific issues of fuel substitution in all sectors taking into account RES and the impact of new technology in the transport sector.
11. In many conversations it was mentioned that gas to the Island could be used for conversion to e.g. methanol. It was even mentioned that one company has reserved land for a methanol plant. This must be seen as opportunistic as offshore Cyprus gas is relatively high cost and unlikely to compete with lower cost gas in the wider Region. Gas conversion to chemicals, whilst not out of the question, must be viewed with a high degree of skepticism.
12. Operator's complained to me that there is no 'one stop shop' within the GoC to obtain required permits. I do not know of any EU country that has such a service but it illustrates the degree of frustration Operators face when dealing with the civil service of Cyprus. This needs to be improved.
13. The Ministry of Education recognizes the extreme shortage of skilled labour and would value exposure to how this is resolved in other countries.
14. Collaboration and support in all knowledge based areas is an urgent need. Areas include R&D, technical/laboratory services, testing/qualification and inspection, HSE management and provision of training (technical and commercial), development of vocational and graduate based programmes,
15. Israel has an abundance of gas but a deficit of export options. It also lacks Operators in its sector that are viable at a global level when it comes to sanctioning multi billion dollar projects. This will affect decision making for Aphrodite. The partners for Aphrodite and Leviathan are almost the same and it is clear that Aphrodite is being relegated behind Leviathan. This will be a serious issue if more 3rd round discovery (ies) are made leading to expeditious development of a multi billion dollar LNG export Terminal. The role of ExxonMobil/QP and/or ENI/Total will be most crucial in these decisions.
16. Israeli exploration of its EEZ will dry up without any viable gas export option.
17. Israel/License holders are in discussion with Turkey about gas export to Turkey (with a pipeline crossing the Cyprus EEZ). This could be problematic (if it goes ahead) without resolution of the Cyprus problem but legally it seems Cyprus could not stop such a pipeline. Whether this issue would reveal itself is uncertain but for sure it will dampen relationships between parties who actually need to help each other in developing the natural gas
18. Lebanon has not given its 1st Licensing Round the best chance of success given that 3 of the Blocks on offer are located where the license boundaries are contested by Israel.

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4.8. Opportunities for Dutch Business

The potential opportunities in the Cyprus offshore for Dutch business in the entire value chain from exploration to gas sales and required support /services to make this happen are summarized below. The business areas covered are:

- **Upstream through to downstream support (design/engineering, facilities etc)**- support to the Exploration seismic/drilling, field appraisal & development drilling, field development/execution including offshore facilities, trunklines etc. Downstream includes provision of gas export infrastructure and services for the gas substitution in the power generation market.
- **Marine & Port services support**- Marine/port services: this includes the provision of port design/construction/operations (Vasilikos) including jetty, berths etc; design/construction of marine supply/logistics bases to support the offshore activity; provision of marine vessels; Provision of heli- support (onshore passenger terminal);
- **Professional services support to both Upstream and Downstream**- Tax structures; Petroleum accounting; unitization experience; long term energy planning; gasification/de-carbonisation: HSE training; Core labs/PVT-local analysis capabilities;
- **University/R&D/Training & development**- forming partnerships and/or collaborating with Cyprus universities/institutes for provision of training, R&D and support services to the Sector;
- **Dutch Government Assistance to the GoC and wider EU collaboration**-The establishment of a successful offshore sector represents many challenges and opportunities to provide assistance at both the Government level (NL: Cyprus) as well as for wide EU collaboration (governance for the sector; lobbying for EU support; marine environmental cooperation and management etc).

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OPPORTUNITIES FOR DUTCH BUSINESS' (SWOT)	
<p>Upstream-Downstream support- support to the Exploration seismic/drilling, field appraisal & development drilling, field development/execution including offshore facilities, trunklines etc. Downstream includes provision of gas export infrastructure and services for the gas substitution in the power generation market.</p> <p>Dutch companies of potential interest:</p> <p>SBM offshore; Heerema Marine Contractors; Allseas; Van Oord; BIGLIFT; Fugro; VBMS; Tebodin (LNG); Anthony Veder (LNG as a marine fuel); TNO LNG for use in trucks); Boskalis Offshore, Huisman etc</p>	<p>O: Upstream Exploration activity 2017/2018 (see Appendix 1)</p> <ul style="list-style-type: none"> • Offshore seismic survey (3D) activity • Offshore seabed topographical surveys/subsea soil sampling studies • Provision of Deep water exploration drilling rigs/ships • Exploration drilling support services: contract staff; equipment; chemical supplies; • Environmental baseline studies for the marine drilling locations <p>O: Upstream Field development-execution activity 2018 onwards (see Appendix 1)</p> <p>Aphrodite field (Noble et al):</p> <ul style="list-style-type: none"> • Offshore seabed topography/soil sampling studies • Offshore/subsea structures for development of Aphrodite; • FPSO/semi submersible design/construction/transport; • Provision of a main trunk pipeline(s) to bring the gas to CYP shore • Heavy lifting/pipe laying: <ul style="list-style-type: none"> ○ heavy offshore lifting facilities ○ ultra deep water pipe laying barge ○ trench/pipe laying barge • Steel tube umbilical's • Subsea well completion technology • Provision of contract manpower for provision of routine process and platform operations and maintenance-process operators, crane drivers, medics, roustabouts, radio operators. • QA/QC inspection services • Pipeline low assurance technology • Quantitative risk assessment <p>O: Upstream Field development planning/Operations (see Appendix 1)</p> <ul style="list-style-type: none"> • independent 3rd party assessment of reserves • Independent 3rd party assessment of deep water drilling plans • Contract staff • Non routine drilling/well services (work-overs etc) • Provision of QA/QC and testing services <p>O: LNG Terminal for gas export</p> <ul style="list-style-type: none"> • Provision of gas export infrastructure including LNG technology and related facilities/services (including gas treatment technology) • Environmental baseline over a large area & oil surveys/soil integrity • Quantitative Risk Assessment for the LNG Terminal and surrounding infrastructure/village • QA/QC services <p>O: Import of LNG for liquid fuel substitution in the Power Generation sector (2020 start up)</p> <ul style="list-style-type: none"> • Design/construction of a LNG regasification terminal for LNG imports • Gas pipeline infrastructure required for fuel substitution in the power sector (to natural gas). <p>O: Use of LNG as a fuel including LNG bunkering (technology and engineering services)-under review.</p> <p>S-NL has a lot to offer with major international players covering the majority of the opportunities listed above. Cyprus could serve as a</p>

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	base/hub for other business opportunities in the area (Israel, Lebanon etc)
	W- Most of the contracts are handled through the Upstream Operators through international tenders/contracts –key therefore is to prequalify for such tenders.
	T-Geo Political risk and Exploration failure
<p>Marine/port services: this includes the provision of port design/construction/operations (Vasilikos) including jetty, berths etc; design/construction of marine supply/logistics bases to support the offshore activity; provision of marine vessels; Provision of heli- support & onshore passenger terminal.</p> <p>Dutch companies of potential interest:</p> <p>Vroon Offshore; HMC; Boskalis Offshore; Anthony Veder; Ports of Amsterdam, Rotterdam and Den Helder etc</p>	<p>O- to support the Upstream Exploration activity 2017/2018 (see Appendix 1)</p> <ul style="list-style-type: none"> Provision of marine supply/logistics bases for the Upstream seismic and drilling and beyond Routine and non routine marine transport logistical support including stand by vessels, diving support vessels, helicopter support <p>O- to support Upstream & Downstream Field development execution/Operations (see Appendix 1)</p> <ul style="list-style-type: none"> As above Provision of routine and non routine contract services and equipment for maintenance campaigns, repair/replacement of safeguarding systems, hoisting equipment, offshore vessels, crane barges etc Provision of a 'dirty' port with all related infrastructure (jetty, berths, barging/tugging etc) for gas landing for LNG processing/export and for gas transmission to the domestic market (for substitution in the power generation sector). This includes port design, construction and operation on a license/lease let by the Cyprus Port Authority
	S-NL has a strong position in the area of Port design/Operations
	W-only 'One chance' to get in through Vasilikos re-development
	T-Cyprus Port Authority is struggling to know how to manage the transition from a Port Operator to Port Manager
<p>Scope for related Professional services: eg Tax structures; Petroleum accounting; unitization experience; long term energy planning; gasification/de-carbonisation: HSE training; Core labs/PVT-local analysis capabilities;</p> <p>Dutch companies of potential interest:</p> <p>Fugro, Tebodin, Versatec, Gas Unie; Gas Terra; Deltares; TNO; NOGEPa etc</p>	<p>O-</p> <p>Long term Country (Vision) Planning-to develop a plan for the Cyprus economy covering not just the natural gas but all aspects including the transition to renewables etc</p> <p>Fuel substitution studies & energy conservation for the domestic and tourist sector;</p> <p>HSE Training; Provision of all types of training services to support the Upstream and Downstream operations as well as provision of Regulatory oversight;</p> <p>QA/QC services to support the Upstream operators (pipe testing etc);</p> <p>Lab testing (solids/fluids) facilities needed; As part of the PSC's all contractors are obliged to invest (train, provide scholarships etc) in training of local staff;</p> <p>Hydrocarbon accounting services for all PSCs (through the BIG 4 accounting firms);</p> <p>Provision of unitization consultation/advice;</p>
	S-Huge scope across every sub sector

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	W-UK/Norway advisors/consultants already exist in Cyprus; Beicip-Franlab offers a myriad of services
	T- Competition: All the key professional service organisations (PWC; KPMG; EY; Deloitte) are well represented in Cyprus and have some of the most able Cypriots working for them and can draw upon their related partnerships
<p>Scope for R&D/University collaboration/L&D/vocational training-forming partnerships and/or collaborating with Cyprus universities/institutes for provision of training, R&D and support services to the Sector</p> <p>Dutch companies of potential interest:</p> <p>Delft University; TNO; ECN; Energy Delta Institute; Delatares; DNV GL etc</p>	<p>O- Cyprus wishes to be a Regional Hub for such services and will need to establish a brand based on professionalism, capacity and capability to provide such services. The CYP Universities (Government funded and private)are hungry for collaborative studies with credible partners. Opportunities include:</p> <p>Development of research programmes to assist the offshore sector;</p> <p>Guidance to the Ministry of Education to develop vocational training at a national level to cover the extreme lack of local skilled staff;</p> <p>Development of graduate Curricula (especially in the geo sciences including carbonate geology) and marine environment studies;</p> <p>Establishment of Laboratories for non routine analysis to support the Upstream and Downstream sector;</p> <p>Provision of advice/consulting related to the development of national policy/ strategies for the sector</p>
	S-The GoC is motivated to move Cyprus to serve as a hub in the area and the provision of these services fits into this. NL has many institutes who can provide support here.
	W- Who pays? A win-win model for cooperation is essential. Potential for EU funding in area of East Med Environmental monitoring
	T- Beicip-Franlab already provide consulting advice and training;
	O- <p>Offshore compliance/governance (EU deep water drilling Directive)- establishing the organization and the training of civil servants;</p> <p>Long Term Gas sector planning and transformation of the economy (eg promoting NOGEPAs ladder of seven)</p> <p>Development of regional environmental and marine studies for the East Med;</p> <p>Development of a petroleum tax/royalty (as opposed to PSC) regime in line with the rest of the EU;</p>
	S- NL has had extensive experience with such collaborative efforts
	W-Takes time to get EU funding
	T- None

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4.8.1 What does the Natural Gas Sector of The Netherlands have to offer and how can it make the offer?

The Netherlands has much to offer Cyprus in support of its efforts to become a significant player in East Med natural gas.

The oil and gas industry in The Netherlands is one of the most developed in Western Europe with over 50 years experience in exploration (onshore and offshore), production, storage, gas distribution/marketing & trading, gas conversion (to chemicals and liquid fuels) and a source of advanced gas technology. The Dutch sector is renowned for its experience in organizing public-private partnerships to manage the business. Equally, the Dutch are leading exponents of finding the balance between over regulation and under regulation and promoting collaboration between the offshore operators as evidenced by their approach to unitization.

The Dutch industry is promoted by the **Association of Dutch Suppliers (IRO)** who acts on behalf of nearly 450 members (reference Netherlands Suppliers Catalogue for the Oil & Gas Industry and Offshore Renewable industry). The Dutch industry is not new to Cyprus with many companies actively doing business in Cyprus. Below is a snapshot of the depth and breadth of what The Netherlands oil & gas industry can offer Cyprus.

The Oil, Gas and Offshore Renewable supply industry in the Netherlands belongs to the Top 5 of the world. Established nearly half a century ago, the association IRO is an independent non-profit organisation that supports and promotes the interests of its nearly 450 member companies.

The association focuses on three important topics that are vital for the continuity of the industry: Trade & Export Promotion, Innovation & Technology and Human Capital & Education. The range of services that IRO provides to its members varies from maintaining government & NGO relations and facilitating networking opportunities within the IRO community to participating in international trade missions and exhibitions as well as providing Business Intelligence and training courses.

Fugro NV-world's leading, independent provider of geo-intelligence and asset integrity solutions for large offshore and onshore projects (topography, soil composition and environmental conditions).

DNV GL-A leading provider of technical assurance services to the oil and gas industry and the leading classification society in the maritime industry.

Offshore Ship Designers (OSD)-is a global one-stop resource delivering naval architecture and marine engineering skills for the shipping and offshore energy industries.

Tebodin BV-a leading global engineering and consultancy company with a track record in upstream, midstream and downstream. The company has developed turnkey solutions for use of LNG as a marine fuel.

Deltares-an independent institute for applied research in the fields of water, subsurface and infrastructure. They cover areas such as hydraulic engineering and hydrology, geotechnical engineering and geology, and environmental engineering and ecology

Versatec-is a global independent technical consultancy firm, offering expertise to worldwide projects and operations.

Huisman-a worldwide operating company with extensive experience in the design and manufacturing of heavy construction equipment (cranes, deep water pipe-lay systems and drilling) for the oil & gas industry.

Allseas-a world leading contractor in offshore pipeline installation, heavy lift and subsea construction.

BIGLIFT-one of the world's leading heavy lift shipping companies specialized in the worldwide ocean transportation of heavy lift and project cargoes.

Mammoet-offers solutions for lifting, transporting, installing and decommissioning large and heavy structures.

Royal Haskoning DHV-is an independent international engineering and project management

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consultancy leading the way in sustainable development and innovation. Its oil & Gas services include expertise on Health Safety and Environmental services for upstream onshore and offshore assets, LNG terminals and liquid bulk terminals we can help you with the Feasibility studies, Basic Engineering and Procurement of port terminals and marine structures.

SPT offshore- is the world leading EPCI contractor and design consultant specialized in suction pile foundations and Self-installing platforms.

Van Oord-operates as a leading contractor for dredging, marine engineering and offshore energy projects offering innovative solutions to marine challenges.

VBMS-delivers end to end project management and multi-disciplinary upstream, sub sea to topside, grid to grid solutions

Vroon Offshore Services BV- excels in the provision of diverse services and solutions for offshore support needs, including platform supply, emergency response and rescue, anchor handling tug supply, walk to walk and subsea support

Hereema Marine Contractors-involved in full field development and excels in transporting, installing and removing offshore structures operating in water depths up to 3500 m.

Boskalis Offshore-designs and develops new ports, or deepens, expands and maintains existing ports around the world. Boskalis also transports port related equipment such as container cranes through Dockwise. Through SMIT and its joint ventures, Boskalis is a global leader in providing day to day in port services such as harbour towage and salvage.

SBM Offshore-supplier of equipment and services for the offshore industry.

Vitol- Vitol is an energy and commodities company and sits at the heart of the world's energy flows. Its primary business is the trading and distribution of energy products globally. Vitol is already operating (since 2014) in Cyprus as an energy and commodities company and has constructed and operates the Oil Products Terminal (VTTV) at Vasilikos with oil storage of 543000 m3.

Energy Delta Institute (EDI)-Energy Delta Institute (EDI) is an international energy business school. Through a rich variety of energy training courses and networking activities we prepare energy professionals for challenges they face in what is a dynamic environment.

Gas Terra-GasTerra buys and sells natural gas. For fifty years, GasTerra has been supplying gas to the major Dutch industries. GasTerra's mission is to maximise the value of natural gas reserves in the Netherlands. It fulfils a public role with regard to the implementation of the Dutch government's Small Field Policy.

Gasunie-Gasunie is a European gas infrastructure company providing transport of natural gas and green gas in the Netherlands and the Northern part of Germany. Gasunie geared to facilitating the market, both the industrial and the domestic gas markets, in the Netherlands, Germany and further afield. This varies from providing gas transport to constructing new infrastructure, from participating in new projects to developing new services.

NOGEPA-is a member of the International Association of Oil and Gas Producers (OGP). Together its members represent more than half of global oil production and around one-third of gas production. NOGEPA covers the following issues:

- Providing a stimulus for new and traditional methods for the exploration and production of oil and gas
- Promoting an understanding of the role of Dutch gas in the energy mix and its contribution to society:
- Promoting safe and environmentally sound business operations
- Exploring and promoting alternative uses for depleted fields and other infrastructure
- Raising awareness of the industry through constructive, proactive communication and consultation with the authorities, stakeholders and the public
- Promoting the sector as a safe industry that offers attractive career prospects

Energy Research Centre-Energy research Centre of the Netherlands (ECN) is the largest energy research institute in the Netherlands. ECN develops new technology and conducts pioneering research in various ways into innovative solutions to facilitate the transition to sustainable energy management.

TNO-TNO is an independent research organization and is funded partially through the Dutch Government and partially by working with clients on commissioned projects as well as through public-private partnerships. TNO works in both upstream (deep water technology) and mid/downstream (gas

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research, LNG bunkering, small scale LNG as a fuel for trucks etc with bot Dutch and International clients. They often work through industry in various locations that have a vested interest in solving technology related issues.

4.8.2 Making the Offer

Providing services/support to the Cyprus offshore sector (and in the region) is possible through a variety of means:

- Participation in International Tenders/Contracts. This is largely controlled by the Upstream license holders (Noble, ENI, Total, XOM/QP).
- Through Industry promotion efforts such as trade forums and international offshore oil/gas exhibitions. The IRO is well versed in such promotions and organizes such events on an annual basis.
- Through specific company initiatives-Several of the major Dutch suppliers (HMS, Fugro, Van Oord, Jumbo Offshore, Boskalis etc) organize through a Forum named 'RoundTable for Africa' such events when entering a new region/country. They organize a one-day symposium inviting various host country representatives and expose them to various aspects of the business and their offer. The Director for International Business at the Netherlands MFAA representative is involved in this Forum.
- Establishing partnerships with suppliers/partners already involved in the offshore activities of Cyprus

Critical success factors to successful business development in Cyprus include:

- On the ground representation
- Direct representation (in the particular area of business) through the various Ministers including the President

Appendix 1 East Med (deep water, >1500 m) Offshore Activity level 2017-2022

	2017	2018	2019	2020	2021/2022+
Cyprus					
1. Cyprus 3 rd Round Exploration activity	3 wells to be drilled by Total/ENI (Block 11) and 2 by ENI (Blocks6); 3D seismic surveys conducted in Block 11	Several wells to be drilled in Blocks 6,8,10,11); 3D seismic survey activity	Several wells to be drilled in Blocks 6,8,10,11	Pending 3 rd round Exploration success-Appraisal activities probably required	
2. Cyprus Exploitation-Aphrodite Field (Block 12) development (development may be impacted by the 3 rd round discoveries)	Discussions with Egypt related to gas export	Discussions with Egypt related to gas export	Project sanction if GSA with Egyptian buyers (could be combined with Leviathan B)		2023 first gas exported
3. Cyprus Exploitation-discoveries from the 3 rd round to be developed				Appraisal/Field development studies/Export options under review	2025+ First gas from successful 3 rd round drilling

Regional Activity level					
-ISRAEL	Leviathan A already sanctioned-first gas to Jordan/Israel 2020 (cost \$3.75 bln) Discussions with EGY and TUR for Phase B Leviathan. Exploration activities will depend on success of Israeli 1 st Licensing round	Discussions with EGY and TUR Exploration activity	Sanction Leviathan B (export) Exploration activity	Project Execution Phase of Leviathan B Leviathan A comes on stream Exploration activity	2022+ Leviathan B export to EGY or TUR (probably EGY)
-Egypt	The Zohr field is already in Execution mode with first gas expected end 2017/early 2018 Exploration of the deep-water blocks will continue	Zohr gas to arrive onshore Egypt (6 wells)	Zohr field expansion	Zohr field expansion Other discoveries to be developed dependent on exploration success	Zohr field expansion Other discoveries to be developed dependent on exploration success
-Lebanon	Finalise 1 st Exploration Round-award blocks	Exploration activity	Exploration activity	Exploration activity	

Appendix 2-Gas Export Options (options of CNG, FLNG, gas conversion to (petro) chemicals not considered realistic front runners)

CYPRUS GAS EXPORT OPTIONS

	Evaluation/Ranking				
	Economic value for Upstream PSC Contractors	Market Flexibility to gas price fluctuations	Cyprus In country Value (to GoC)	Other factors	Comments
Pipeline Options – assumes only CYP Aphrodite gas available (no 3rd Round discoveries)					
1. Pipeline to Egypt	Will Cyprus Block 12 (Aphrodite) enjoy a margin based on LNG export or Egypt domestic gas price? Should be viable.	Limited-but depends on price terms and whether Aphrodite gas is for LNG export market or for the Egypt domestic market	Limited	Does not bring gas to the Island. Issues of stability and risk. First gas timing around 2023	Egypt-huge demand; owns existing export LNG capacity (ENI; Shell) and will not want competition with a Cyprus LNG plant. Egypt demand is some 48 bcm/yr-almost 50% of its primary demand
2. Pipeline to Turkey	Will Turkey allow access to export infrastructure to EU-probably not. Probably would be viable.	Limited	Limited	Politically unacceptable; higher country risk	Huge market-Turkey uses some 44 bcm NG/yr-almost 30% of its primary demand
Options – 3rd Round discovery (ies) in Cyprus					
1. Pipeline to Egypt	Same as 1 above				
2. Pipeline to Turkey	Same as 2 above				
3. LNG Terminal on the island	Requires some 8-10 Tcf gas (eg Aphrodite, 4.5 Tcf, plus a field (s) of 4-5 Tcf recoverable volumes (from 3 rd round discoveries)	Yes, within the confines of the LNG supply contracts	Yes, High	Capital intensive	The IOCs operating in the Cyprus EEZ more than capable of covering the high level of capital intensity. Viability required from perspective of IOCs as well as GoC or other interested parties. Israel could be a potential customer to export its gas. Egypt LNG players (ENI, Shell) will not be too keen for LNG competition in Cyprus.
4. East Med Pipeline	EU funded concept study claimed viability	Limited	Limited-depends whether the pipeline comes ashore in Cyprus	Capital intensive;	Existing partners do not include any Upstream players to cover capital cost or to pledge resource volumes. Not yet a serious contender to an LNG Terminal on the Island.

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