
REPORT

EASTERN MEDITERRANEAN GAS FIELDS AND A NEW ENERGY CORRIDOR TO EUROPE

ERPIC Energy Program

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The author is responsible for the views expressed in this report and any mistakes are solely his.

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REPORT

EASTERN MEDITERRANEAN GAS FIELDS AND A NEW ENERGY CORRIDOR TO EUROPE

Executive Summary

Several states in the Eastern Mediterranean, including Israel and Cyprus are currently developing their offshore hydrocarbon resources. In 2010, the US Geological Survey estimated that the *Levant Basin* (offshore Israel, Gaza, Lebanon, Syria and Cyprus) holds reserves of 1.7 billion barrels of recoverable oil and approximately 122 trillion cubic feet of natural gas, while the *Nile Delta Basin Province* (offshore Egypt) holds reserves of 1.8 billion barrels of recoverable oil, 223 trillion cubic feet of recoverable gas, and 6 billion barrels of natural gas liquids. The prospect of large recoverable energy resources promises important economic and other changes for the region.

Existing and proposed natural gas transit routes from Russia and the Caspian region form the main *East-West* energy corridors to Europe. As EU dependency on natural gas is expected to increase by 40% in the next twenty years, the establishment of an *Eastern Mediterranean Energy Corridor* linking current and future offshore natural gas discoveries in the Eastern Mediterranean with the European continent would allow the EU to further diversify its energy supplies.

The *Eastern Mediterranean Energy Corridor* is a project that could enhance bilateral relations and EU involvement in the Eastern Mediterranean. Israel and the Republic of Cyprus have already moved closer, and are looking at different options of extending their cooperation in the energy field. Lebanon is also making preparations for a first offshore licensing round, and it too is likely to develop into a natural gas producer and potential exporter.

Cyprus, together with other southern EU member states should take the initiative for the construction of a new natural gas corridor to Europe and its incorporation into the broader energy security policy of the EU. Hand-in-hand, a regional liquefaction facility in Cyprus would facilitate the further exploration and production of the Eastern Mediterranean gas fields, and help provide other regional gas producers ready access to the European energy market.

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September, 2012
Larnaca, Cyprus

EASTERN MEDITERRANEAN GAS FIELDS AND A NEW ENERGY CORRIDOR TO EUROPE

INTRODUCTION

Recent discoveries of natural gas in the Eastern Mediterranean are already altering the geopolitical map of the region. The idea of coordinating the export of energy resources of Israel and Cyprus is being widely discussed. Existing pipelines from Russia, North Africa, and Norway together with the proposed pipeline projects from the Caspian Sea Basin through Turkey form the main natural gas corridors to Europe. All of these transit routes are sourced from, and/or controlled by, non-EU member states, some of whom are not natural allies of the EU. A new East-West transit route linking current and future Eastern Mediterranean Gas Fields¹ to the European continent, would diversify Europe's energy supplies, and further improve European energy security. Without minimizing the difficulties of such a project, the concept of an *Eastern Mediterranean Energy Corridor* merits serious consideration.

BACKGROUND

In March 2010, the U.S. Geological Survey (“USGS”) published two studies entitled “*Assessment of Undiscovered Oil and Gas Resources of the Levant Basin Province, Eastern Mediterranean*”, and “*Assessment of Undiscovered Oil and Gas Resources of the Nile Delta Basin Province, Eastern Mediterranean*”. The USGS estimated that the Levant Basin held potential reserves of 1.7 billion barrels of recoverable oil (“*bbl*”), and a mean of 122 trillion cubic feet, (“*tcf*”), (approximately 3.45 trillion cubic meters) of recoverable natural gas, while the Nile Delta Basin held 1.8 billion bbl of recoverable oil, 223 tcf of recoverable gas, and 6 billion bbl of natural gas liquids.²

During recent years, there have been important offshore hydrocarbon discoveries in the Eastern Mediterranean that tend to confirm these estimates. Countries in the region are now at various stages of exploration and development. In Israel, the Ministry of Energy and Water Resources estimates (May 2012 assessment) that Israel's total offshore natural gas reserve potential, is about 49.4 tcf (1400 billion cubic meters “*bcm*”).³ Israel natural gas consumption stood at 5.3 bcm in 2010 out of which 60% was supplied by domestic fields. The remainder was, until 2012,⁴ supplied by Egypt. British Gas estimates the discovered reserves offshore Gaza to

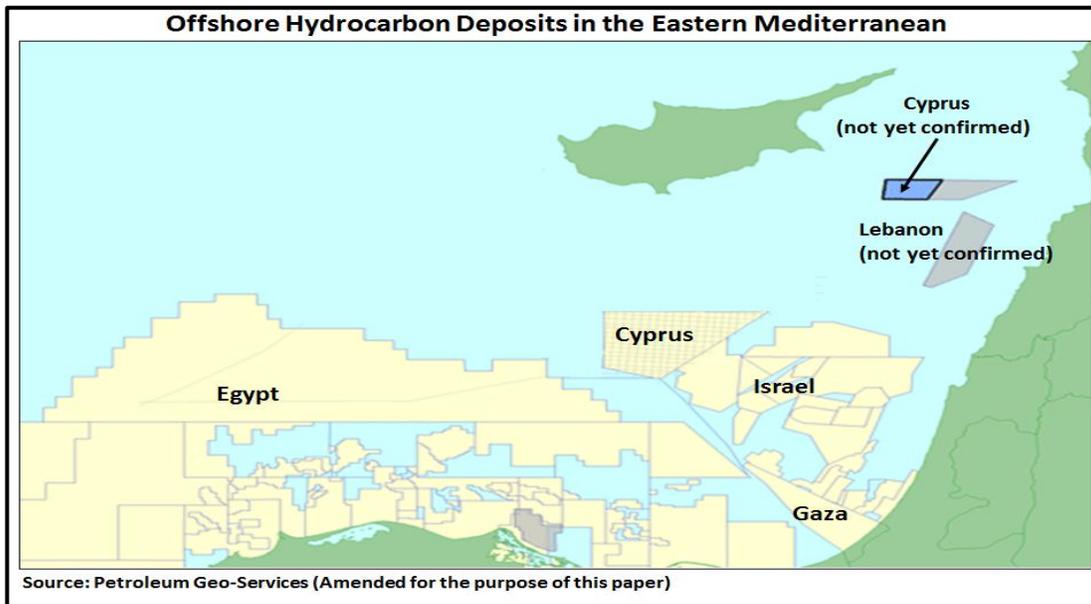
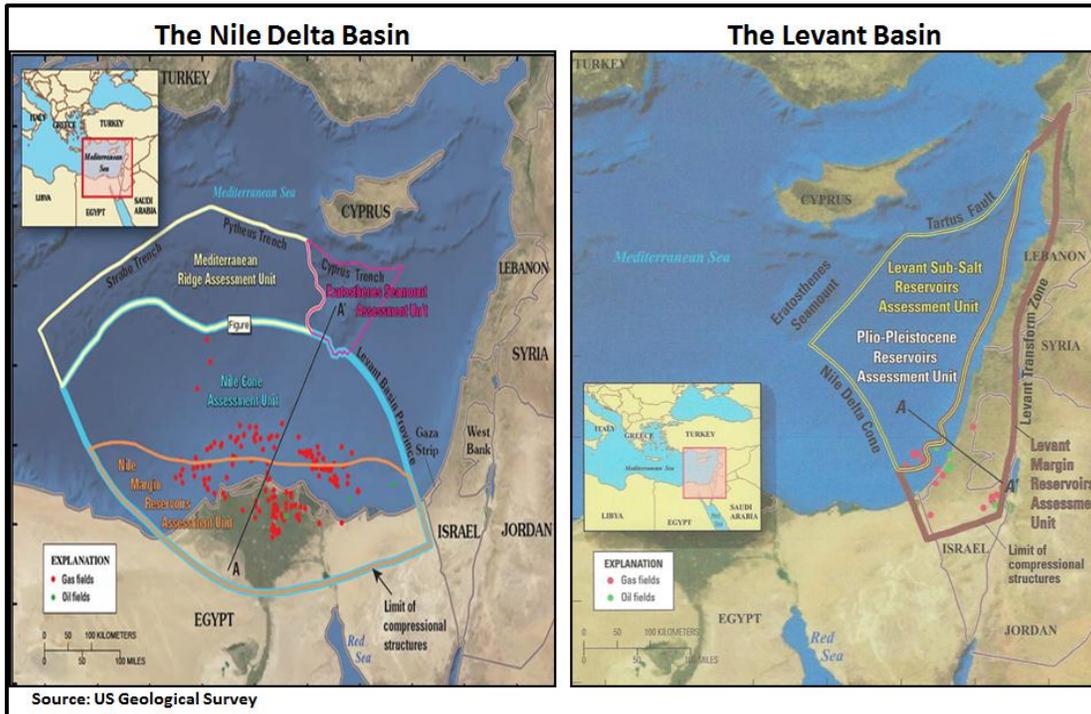
¹ The term “*Eastern Mediterranean Gas Fields*” as used in this paper describes natural gas fields located in the Levant Basin (an area that covers offshore Syria, Lebanon, Cyprus and Israel), the Nile Delta Basin (offshore Egypt), as well as the area between islands of Cyprus and Crete.

² U.S Geological Survey, ‘*Assessment of Undiscovered Oil and Gas Resources of the Levant Basin Province, Eastern Mediterranean March 2010*’, <http://pubs.usgs.gov> (Last accessed 02.07.12); U.S Geological Survey, ‘*Assessment of Undiscovered Oil and Gas Resources of the Nile Delta Basin Province, Eastern Mediterranean, March 2010*’, <http://pubs.usgs.gov> (Last accessed 02.07.12).

³ Ministry of Energy and Water, Israel, ‘*Directorial Abstract of the Inter-Ministerial Committee to Examine the Government's Policy Regarding Natural Gas in Israel*’: published 4 May 2012, <http://energy.gov.il> (Last accessed 25.06.12).

⁴ Egypt and Israel signed a memorandum of understanding for the import of natural gas from Egypt to Israel in 2008. At the same time, a natural gas purchase agreement was signed between the Israel Electric Corporation and the Israeli-Egyptian joint venture company Eastern Mediterranean Oil & Gas (EMG). In April 2012, Egypt cancelled the 20 year contract on the basis that the Mubarak regime had concluded the agreement below market price.

around 1 tcf (approx. 28.3 bcm).⁵ In 2011 proven reserves in Egypt stood at 77.3⁶ tcf (2188.8 bcm), and in December 2011, the first well in Cyprus' Exclusive Economic Zone ("EEZ") indicated a possible reserve of approximately 5-8 tcf (141.5-226.5 bcm).⁷



In May 2012, Cyprus launched a second offshore licensing round which attracted several major international exploration companies. Meanwhile, Lebanon is preparing to launch its first offshore licensing round by the end of 2012. These important energy resources at the Eastern end of the Mediterranean could form an additional

⁵ BG Group Homepage – ‘Where we Operate’, <http://www.bg-group.com/> (Last accessed 20.07.12).

⁶ BP Statistical Review of World Energy June 2012 – ‘Natural Gas Section’ <http://www.bp.com/> (Last accessed 02.07.12).

⁷ The results from the first well indicated an estimated gross resource range of 5 to 8 tcf, with a gross mean of 7 tcf. Noble Energy Inc. Homepage – ‘Press Release’, 28.12.11, <http://investors.nobleenergyinc.com/> (Last accessed 02.07.12).

natural gas supply for Europe. Of particular importance, in the security context is that a sizable proportion of the reserves are situated in the EEZ of an EU member state.

EUROPEAN ENERGY SECURITY

According to the International Energy Agency, natural gas accounts for approximately 22% of the world energy mix.⁸ Compared with other fossil fuels, natural gas offers many advantages such as relatively low greenhouse signature, far fewer pollutants than coal, energy efficiency and ease of use. With the EU's own proven natural gas supplies limited,⁹ the need for greater diversity in the petroleum and natural gas sector is vital to the energy security of the 27-member economic and political union. Although over the next 10 years fracking technologies for shale gas are likely to considerably add to Europe's natural gas reserves, there are widespread concerns over the extraction process, which may delay the exploration of this valuable asset. In 2011, EU consumption of natural gas was approximately 447.9 bcm.¹⁰

In 2007 the EU Directorate-General for Research released a report, under the title of "*Energy Corridors: European Union and Neighboring Countries*",¹¹ which called for a European Energy Policy that considered both internal and external dimensions. The "internal" dimension referred to the emergence of new energy technologies while the "external" dimension focused on "*Energy Corridors*" linking the EU to its neighbors, both as suppliers and for transit. The report concluded that energy corridors are a key element of EU energy policy as they contribute to security of energy supply and ultimately to the competitiveness and sustainability of the Union.¹²

The report identified several gas corridors into Europe through the North Sea, the Baltic Sea, the Mediterranean and Turkey. Within these corridors six pipeline projects emerge as priority projects: the *Langeled* (between Norway and the UK), the *Nord Stream* (between Russia and Germany), *Medgaz* (between Algeria and Spain), *Galsi* (between Algeria and Italy), *Nabucco* (starting at the Caspian Sea and through Turkey and connecting to Greece and/or the Eastern Balkans and Austria).¹³

All projects, except Nabucco, have been realized with Nord Stream being the largest. Operated by Nord Stream AG, it runs from Vyborg in Russia to Lubmin in Germany, stretching for 1,224 km making it the longest offshore pipeline in the world. The twin pipeline system will, by its completion in late 2012, be the most direct connection between gas reserves in Russia and the EU market with a capacity of 55 bcm/year.¹⁴ The project is, however, not without controversy as it has been criticized for its environmental impact on the Baltic Sea, and for increasing Europe's dependence on Russian gas. Natural gas imports from Russia stood at

⁸ International Energy Agency, '*Natural Gas*', <http://www.iea.org/> (Last accessed 02.07.12).

⁹ EU proven reserves of natural gas stood at 64.4 tcf in 2011, accounting for approximately 0.9% of the world's proven reserves. BP Statistical Review of World Energy June 2012 – '*Natural Gas Section*', <http://www.bp.com/> (Last accessed 02.07.12).

¹⁰ BP Statistical Review of World Energy June 2012 – '*Natural Gas Section*', <http://www.bp.com/> (Last accessed 02.07.12).

¹¹ EU Bookshop, '*Energy Corridors European Union and Neighboring Countries (2007)*', <http://bookshop.europa.eu> (Last accessed 02.07.12).

¹² EU Bookshop, '*Energy Corridors European Union and Neighboring Countries (2007)*', <http://bookshop.europa.eu> (Last accessed 02.07.12).

¹³ EU Bookshop, '*Energy Corridors European Union and Neighboring Countries (2007)*', <http://bookshop.europa.eu/> (Last accessed 02.07.12).

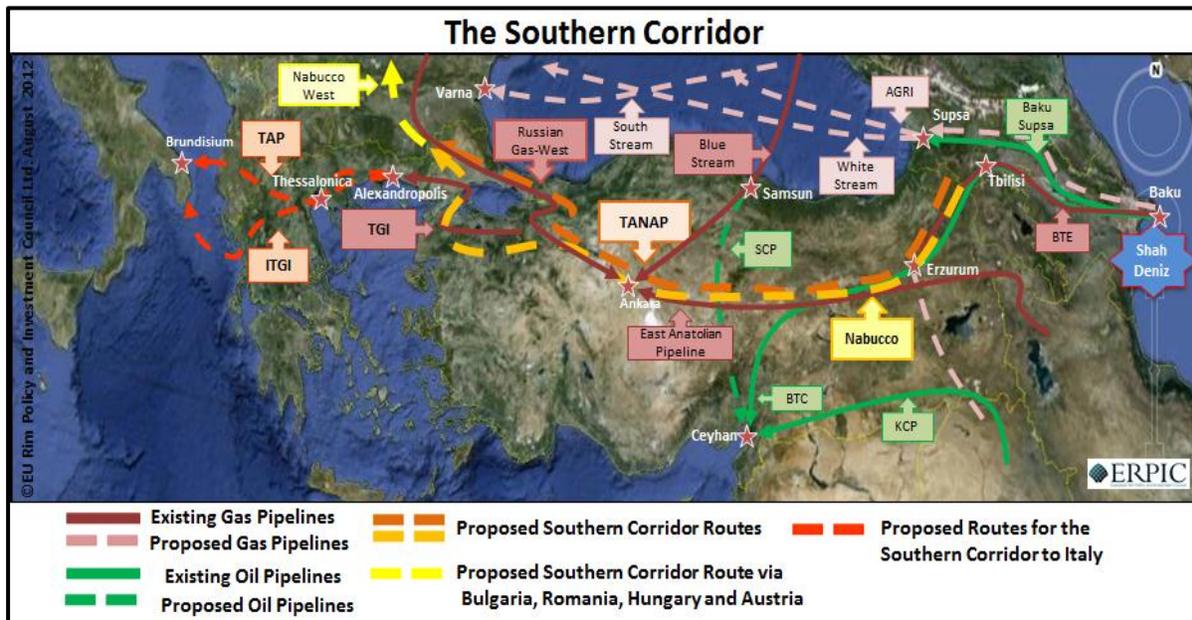
¹⁴ North Stream AG Homepage – '*The Pipeline*', <http://www.nord-stream.com/> (Last accessed 25.08.12).

140.6 bcm in 2011, which accounted for 38% of the EU’s total gas imports that year. These imports are destined to increase with the final implementation of the Nord Stream pipeline system.

In November 2010, the European Commission outlined its energy infrastructure priorities until 2030. In an effort to diversify from its dependence on Russia, Europe’s new priorities included the “North-South Corridor” in Western Europe, aimed at removing internal bottlenecks and enabling better use of external supplies; the “Southern Corridor” carrying gas from the Caspian Sea through Georgia and Turkey; and the linkage of the Baltic region to Central and South Eastern European energy markets.¹⁵



¹⁵ Natural and Bio Gas Vehicle Association, ‘North-South Natural Gas Corridor Approved’, <http://www.ngvaeurope.eu/> (Last accessed 02.07.12).



By 2011, the total amount of natural gas imported by EU member states via pipeline and LNG reached 333.1 bcm and 65.4 bcm respectively.¹⁶ The primary sources of gas were from Russia, Norway, Algeria and Qatar.¹⁷

In 2011, the Commission published a report on the security of energy supply and international cooperation.¹⁸ The report stated that Europe is currently importing some 60% of its gas and 80% of its oil, and that it is estimated that these figures may increase by 40% by the year 2030. The report stressed the ‘importance of the Mediterranean in EU energy supplies’, and expressed the need for active engagement in promoting the ‘energy infrastructure of this region’.¹⁹ The EU called for consistent and well-coordinated energy policies by and among its members as vital to the further development of the internal market.²⁰ Alternative non-Russian gas supplies, especially from the Caspian region via Turkey, have become increasingly important for Europe. Turkey itself is also a significant regional energy consumer, and is increasing its involvement in international projects not only as a transit country but also as a large end-user. There are several inter-governmental gas pipelines in operation, such as the Blue Stream gas pipeline between Russia and Turkey, the Baku-Tbilisi-Erzurum (“BTE”, also known as the South Caucasus Pipeline), the Tabriz-Ankara gas pipeline, and the Turkey-Greece Interconnector (“TGI”).²¹

¹⁶ The figures only include EU member states. BP Statistical Review of World Energy June 2012 – ‘Natural Gas Section’ <http://www.bp.com/> (Last accessed 02.07.12).

¹⁷ BP Statistical Review of World Energy June 2012 – ‘Natural Gas Section’ <http://www.bp.com/> (Last accessed 02.07.12).

¹⁸ COM (2011) 539 final, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions On Security of Energy Supply and International Cooperation – ‘The EU Energy Policy: Engaging with Partners Beyond Our Borders’, <http://eur-lex.europa.eu/> (Last accessed 02.07.12).

¹⁹ COM (2011) 539 final, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions On Security of Energy Supply and International Cooperation – ‘The EU Energy Policy: Engaging with Partners Beyond Our Borders’, <http://eur-lex.europa.eu/> (Last accessed 02.07.12).

²⁰ COM (2011) 539 final, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions On Security of Energy Supply and International Cooperation – ‘The EU Energy Policy: Engaging with Partners Beyond Our Borders’, <http://eur-lex.europa.eu/> (Last accessed 02.07.12).

²¹ Journal of Energy Security, ‘The Role of Turkey in Global Energy: Bolstering Energy Infrastructure Security’, Hasan Alsancak, May 2010 Issue, <http://www.ensec.org/> (Last accessed 02.07.12).

Responsibility for infrastructure security weighs heavily on Turkey, and other states that host critical energy infrastructure assets. Global terror organizations have declared pipelines as legitimate targets. An example of this is the 2011 bombings the El Arish natural gas compressor station and the Egyptian sections to of the pipelines supplying Israel and Jordan. In the case of Turkey, the Turkish section of the Kirkuk-Ceyhan pipeline and the Iran-Turkey gas pipeline has also been attacked on numerous occasions. On 5 August 2008, a terrorist strike on the Baku-Tbilisi-Ceyhan (“BTC”) pipeline disrupted the flow of oil through the pipeline for two weeks.²² In May 2012, the BTE pipeline exploded in the Turkish section, suspending supplies until 11 June 2012. Speculations that the Kurdish Workers Party (“PKK”) was responsible have yet to be confirmed.²³ The explosion cut off 16% of Turkey’s daily gas use, and forced the country to rely on stored supplies and expensive imports from Russia. BOTAS, the operator of the Turkish section of the pipeline, was reluctant to admit sabotage fearing loss of investor confidence. Nevertheless, such incidents have broad implications for the security of the Southern Corridor. Regular attacks would increase security costs along the Turkish route, which would largely be shouldered by BOTAS. It would also be a source of frustration among BOTAS’s partners such as Azerbaijan’s SOCAR and the operating consortium of the Azerbaijani Shah Deniz field, headed by BP.²⁴ While the planned Trans-Anatolian Pipeline (“TANAP”) is estimated to have a capacity of 16 bcm/year (10 bcm/year will be earmarked for Europe), with an increase to 24 bcm/year at a later stage, any disruption of the flow of gas would have an impact on Europe.²⁵ With this degree of risk, Europe would be wise, therefore, to diversify and maintain a secure source of supply.

Turkey aspires to become a major transit hub for energy to Europe. Russia too, would clearly like to monopolize the European markets and transit routes, certainly for economic and maybe for political reasons as well. Russia is antipathetic to Turkey having an independent presence in Central Asia and the Caucasus region. Both nations have competing ambitions in Eurasia, a fact that complicates their otherwise positive economic relations.²⁶ After redirecting natural gas from its storage facilities in Europe during the winter of 2011, Gazprom now wants to build underground natural gas storage facilities in Turkey.²⁷ Russia would like to increase its influence over Turkey’s energy sector, and Ankara may find it difficult to withstand Russian pressure. Alternative natural gas supply options for Turkey, such as from Iran, or the expansion of the Shah Deniz II field in Azerbaijan or even the use of Liquefied Natural Gas (“LNG”) imports are years away.²⁸ Meanwhile, Russia is looking to establish itself in other parts of the Eastern Mediterranean. Russian International Oil Companies²⁹ (“IOCs”) are taking part in the second licensing round offshore Cyprus, and Gazprom, who exported 2.9 bcm of gas to Greece in 2011, has shown interest in acquiring a stake in Greece’s state-owned gas company (“DEPA”), scheduled for privatization due to the country’s financial difficulties.³⁰

²² Journal of Energy Security ‘*The Role of Turkey in Global Energy: Bolstering Energy Infrastructure Security*’, Hasan Alsancak, May 2010 Issue, <http://www.ensec.org/> (Last accessed 02.07.12).

²³ Natural Gas Europe, ‘*The BTE Pipeline Blast: The Implications of Sabotage*’, 14.06.12 <http://www.naturalgaseurope.com/> (Last accessed 02.07.12).

²⁴ Natural Gas Europe, ‘*The BTE Pipeline Blast: The Implications of Sabotage*’, 14.06.12, <http://www.naturalgaseurope.com/> (Last accessed 02.07.12).

²⁵ BP Statistical Review of World Energy June 2012 – ‘*Natural Gas Section*’ <http://www.bp.com/> (Last accessed 02.07.12)

²⁶ The Heritage Foundation, ‘*Countering Turkey’s Strategic Drift*’, S. McNamara, A. Cohen and J. Phillips, No. 2442, (2010).

²⁷ Stratfor, ‘*Russia’s Energy Plans for Turkey*’, 20.03.12, <http://www.stratfor.com/> (Last accessed 02.07.12).

²⁸ Stratfor, ‘*Russia’s Energy Plans for Turkey*’, 20.03.12, <http://www.stratfor.com/> (Last accessed 02.07.12).

²⁹ Russia’s Novatek Overseas Exploration and Production GmbH and Gazprom Bank Global Resources are participating in a consortium together with Total E&P Activities Petroliers who serves as the consortium operator.

³⁰ Gazprom Homepage – ‘*Gazprom Group considers potential bidding for DEPA*’, 16.03.12, <http://www.gazprom.com/> (Last accessed 02.07.12).

Gazprom is also looking to become involved in the development of Israeli hydrocarbon projects.³¹ Given Europe's existing heavy reliance on gas from Russia, one wonders if allowing Russia to assume a dominant position in the Eastern Mediterranean is in Europe's wider economic and security interests.

THE CONCEPT OF A NEW ENERGY CORRIDOR TO EUROPE

Existing pipelines from Russia into northern Europe, and proposed pipelines from the Caspian throughout Turkey, form the main East-West natural gas corridors to Europe. A new energy corridor that would carry gas from current and future Eastern Mediterranean Gas Fields to Europe could be a significant contribution to European energy security.

The idea for the joint export of Israeli and Cyprus hydrocarbon resources first surfaced in the beginning of 2011 in an initiative by the Delek Energy Group and Noble Energy Inc., licensees of Cyprus' Block 12, in which the *Aphrodite* field is located. The two companies called for the construction of a liquefaction facility on Cyprus that, in its initial stages, would process and export natural gas received from the Israeli *Leviathan* field (estimated at 17 tcf) and the Cyprus Aphrodite field. The facility would be planned with the intention of accommodating additional discoveries including those by third parties.³²

Discussions of this and other ideas continued in the press and among stakeholders during 2011 and early 2012. Some of the competing suggestions included: transporting gas to Israel for the purposes of electricity production; the creation of LNG stations in Israel instead of Cyprus in order to supply world markets; the creation of floating facilities for the liquefaction of natural gas ("*FLNG Facilities*") instead of a land based facility in Cyprus; the creation of a pipeline connecting Cyprus and Israeli fields to Greece and Italy; and the use of Israeli and Cyprus gas to produce electricity for export to Europe via high voltage undersea cables.³³ In this context, it is also important to note that with regard to Israel, security concerns and satisfaction of domestic demands will be major considerations in any export plans. For Cyprus too, similar considerations will apply, but since its domestic market is small (less than 1 bcm/year) most of its gas will be earmarked for export.

Any project that would carry gas from the Eastern Mediterranean to Europe would have to take into account several important geopolitical facts. For the moment, only Israel and Cyprus have a prospect of commercializing their gas deposits. Regional cooperation in the Eastern Mediterranean will be difficult due to maritime disputes between Israel and Lebanon, between Cyprus and Turkey, as well as the long running maritime dispute between Greece and Turkey. Offshore exploration in Syria is unlikely to take place as long as the country's political turmoil persists. Exploration offshore Gaza is not progressing, and Lebanon has yet to announce its first licensing round. Egypt already possesses a well-developed natural gas export sector (with liquefaction facilities in Damietta and Idku), and could, therefore, link to any new energy corridor to Europe.

³¹ Interfax Energy, '*Gazprom's Play for Israel's Offshore Gas Bounty*', Volume 2 Issue 131, Friday 13 July 2012. www.interfaxenergy.com (Last accessed 13.07.12).

³² Middle East Economic Survey, '*Israel's Delek Proposes Building LNG Facility in Cyprus*', Vol LV, No 3, January 2011, <http://archives.mees.com/> (Last accessed 02.07.12).

³³ Natural Gas Europe, '*Five Ways for the Third Corridor by Cyprus*', 29.04.12, <http://www.naturalgaseurope.com/> (Last accessed 02.07.12).

The level of Egypt's participation would, however, depend on the country's domestic stability, its relations with Israel and its own growing energy demands.

The natural gas discoveries in the Eastern Mediterranean have brought attention to a region that historically played a limited role in the European energy equation, but this could now change significantly. While the Southern Corridor through Turkey remains an energy priority for the EU, the development of an additional East-West energy corridor could establish a route by which the EU would be able to diversify its natural gas supply without being dependent on non-EU sources and transit routes. This could be of considerable strategic and economic importance to the EU as a whole.

At present, only Israel, and Egypt, has substantial quantities of natural gas. Despite estimated deposits in the Aphrodite field in Cyprus' Block 12, the proven reserves remain to be confirmed. While this is a positive development for the Republic of Cyprus, it is not yet enough to seek major financing to build an export industry. The second licensing round in Cyprus, which closed in May 2012, attracted several major IOCs³⁴ that are willing to invest in the exploration of new areas within Cyprus' EEZ. More deposits are thus expected to be discovered over the next 3-5 years. Meanwhile, Lebanon's first offshore licensing round may be stalled as Lebanon suffers the political fallout from the escalating turmoil in Syria. Potentially, however, any Lebanese fields discovered could add significant additional reserves within the Eastern Mediterranean, thereby increasing the total amount of available gas at Europe's doorstep.

ECONOMIC CONSIDERATIONS AND POLICY DECISIONS

Whether produced offshore or onshore, natural gas must be transported to the end-user in one or more target markets. Transportation costs of natural gas, whether produced onshore or offshore, form an important element in its commercialization. For pipeline projects, the cost are usually directly proportional to the length of the pipeline for any given flow rate or pipeline diameter. Offshore pipelines are more expensive than onshore pipelines, as are very large diameter pipelines, and pipelines with additional compression facilities. An alternative is to liquefy the gas and transport it by sea. This option, however, only becomes economically feasible in the case of long distances,³⁵ or when the construction of a pipeline becomes complicated due to geographical or geo-political reasons.³⁶

Economics aside, national interest and security considerations are important elements in the realization of any major energy project, especially a multinational one. The Cyprus government announced in April 2012, its

³⁴ Petra Petroleum (Canada); ATP East Med No 2 BV (US); Naphtha Israel Petroleum Corporation Limited (Israel); DOR Chemicals Limited (Israel); Modiin Energy Limited Partnership (Israel); Total E&P Activities Petroliers (France); Novatek Overseas Exploration and Production GmbH (Russia); Gazprom Bank Global Resources (Russia); Premier Oil (UK); VITOL (UK); PETRONAS (Malaysia); Edison International S.p.A (Italy); Delek Drilling Ltd Partnership (Israel); Avner Oil Exploration Ltd Partnership (Israel); Enel Trade S.p.A (Italy); Woodside Energy Holdings PTY Ltd (Australia); ENI (Italy); KOGAS (Korea); C.O. Cyprus Opportunity Energy Public Company limited (Cyprus/Israel); AGR (Norway); OAK Delta NG Exploration Joint Venture (Israel/US/Cyprus); Capricorn Oil (UK); Marathon Oil (US); Orange NASSAU Energie (Holland); CC Energy SAL (Lebanon); WINEVIA Holdings Limited (Cyprus); RX Drill Cyprus Limited (Cyprus); PT Energy Mega Persada Tbk & Frastico Holdings Limited (Canada/Indonesia/Cyprus); Emmanuelle Geo Global Rosario (Israel) - Ministry of Commerce, Industry, and Tourism, Republic of Cyprus, www.mcit.gov.cy

³⁵ Expert's opinions differ on the issue of the economic feasibility of long distance pipelines. As a rule of thumb, however, the cost effectiveness of pipelines vs. LNG shifts at distances that goes beyond 5,000 km onshore, and 2,000 km offshore.

³⁶ P. Roberts, *Gas Sales and Gas Transportation Agreements: Principles and Practice* (Sweet and Maxwell, 2011), p.16

decision to construct an underwater pipeline linking Block 12 to a 5 million tons per annum (“*mtpa*”) (approximately 7 bcm/year) onshore natural gas liquefaction facility to be constructed on the southern coast of Cyprus.³⁷

Israel also has plans to construct its own liquefaction facility for export purposes. Israel’s inter-Ministerial Committee, headed by the Director-General of the Ministry of Energy and Water, Saul Zemach, was set-up with the purpose of evaluating export alternatives. In August 2012, the *Zemach Committee* released its report, which recommended that fields with more than 200 billion cubic meters (bcm) will need to reserve 50% for the domestic market. Fields with 100-200 bcm will need to reserve 40%, and fields with 25-100 bcm 25%. There is no export restriction recommended for fields containing less than 25 bcm. The export limit of any one field is recommended to be set at 75%.³⁸ While the Committee’s interim report, released in April 2012, ruled out the possibility of Israeli gas being exported via non-Israeli facilities, the final report still recommends that exports should be conducted from Israel, but that this is not necessary a requirement.³⁹

Prime Minister Netanyahu is facing strong opposition from Israeli environmentalists, and concerned citizens who object to an LNG facility in their community. There are also concerns regarding the funding of such projects.⁴⁰ In addition, the policies of the Israeli government do not always run parallel with the companies that are licensed to explore the gas. The seemingly changed position of the Zemach Committee’s position on this particular issue increases the possibility that Israel and Cyprus could agree on joint exports in the future.

Meanwhile, in early 2012, the National Gas Pipeline Company of Israel and the Eilat-Ashkelon Pipeline Company submitted a proposal to the Israeli Minister of Finance for a LNG Facility in Eilat. The cost of such a project is estimated at about \$6 billion.⁴¹ Eilat would give Israel access to the Red Sea, and hence the Asian market without the political constraints likely from the Suez Canal. In addition, Israel has also been looking at the option of one or more FLNG facilities. The partnership of the Israeli Tamar field has already signed a memorandum of understanding to develop FLNG with a consortium of companies led by the South Korean company Daewoo.⁴²

Floating liquefaction technology allows producers to bring liquefaction directly to the source of offshore natural gas. However, the cost of such projects is high and depends on relatively calm waters. From a financing perspective, lenders and buyers may also question the security of FLNG facilities in waters vulnerable to marine terrorism.⁴³ Moreover, FLNG technology is quite complex, and must be fitted into limited vessel space.

³⁷ Natural Gas Europe, ‘*Cyprus Opts for LNG Terminal for Offshore Gas*’, 11.06.12, <http://www.naturalgaseurope.com/> (Last accessed 02.07.12).

³⁸ Interfax Energy, ‘*Tzemach Report Welcomed by Israel’s Explorers*’, Volume 2 Issue 165, 31.08.12, www.interfaxenergy.com (Last accessed 01.09.12).

³⁹ Interfax Energy, ‘*Tzemach Report Welcomed by Israel’s Explorers*’, Volume 2 Issue 165, 31.08.12, www.interfaxenergy.com (Last accessed 01.09.12).

⁴⁰ Delek Group Homepage – ‘*Investor Relations*’, <http://ir.delek-group.com/> (Last accessed 20.06.12).

⁴¹ Globes News, ‘*Gov’t cos want to build \$6b Eilat LNG facility*’, 10.01.12, <http://www.globes.co.il/> (Last accessed 10.07.2012).

⁴² Delek Group Homepage – ‘*Investor Relations*’, <http://ir.delek-group.com/> (Last accessed 20.06.12).

⁴³ King & Spalding, ‘*The Top 10 Issues Facing the LNG Industry in 2012*’, 01.03.12, Philip Weems, Matt Salo, <http://www.kslaw.com/> (Last accessed 25.05.12).

FLNG facilities are expected to yield 75% of the capacity of a conventional land based LNG liquefaction facility, with just 5% of the surface area.⁴⁴

There are a number of major IOCs with advanced research projects on FLNG. There are also several projects under construction. Royal Dutch Shell's 'Prelude' FLNG project off Western Australia is to be the first of such projects to be completed. Shell took the final investment decision in May 2011 and Japan's INPEX Corporation joined the project in March 2012.⁴⁵ Upon completion, Prelude will be the largest manmade floating object, measuring 488m long and displacing 600,000 tons of water.⁴⁶ It will have a capacity of 3.6 mtpa (approximately 4.9 bcm).⁴⁷ It is estimated that the Prelude will cost \$3 billion to construct.⁴⁸ Other major companies that are exploring this technology are Australia's Woodside Petroleum, Malaysia's PETRONAS, and Brazil's PETROBRAS.⁴⁹

REGIONAL DISPUTES

Existing regional tensions and political instability in the Eastern Mediterranean, and especially continuing maritime border disputes, add to the risk and complexity of hydrocarbon exploration and exploitation in the region. While regional Islamist groups have gained new ground since the Arab Spring, it is Turkey that has gained the most regional influence. Turkey's new regional profile has also been felt by Turkey's non-Muslim neighbors. Following the Gaza flotilla incident in 2010, relations between Turkey and Israel have deteriorated considerably, as have Turkish and Greek relations despite U.S. and NATO efforts to mediate.

Turkish violations of Greek and Cypriot airspace have become daily occurrences. Turkey has also escalated its claims in the Eastern Mediterranean in areas that form part of Cyprus' EEZ or are claimed by Greece. In this highly confrontational atmosphere, Turkey objected to the second licensing round conducted by the Republic of Cyprus in Cyprus' EEZ. Turkey, arrogating the perceived rights of the Turkish Cypriots, has granted licenses over large sections of Cyprus' EEZ to TPAO, Turkey's national energy Exploration and Production Company. While Turkey has not received any international support for its claims, Ankara has issued warnings of its intention to blacklist companies that engage in Cypriot exploration activities.⁵⁰

⁴⁴ LNG World News, 'Malaysia Lloyd's Register Launches FLNG Rules', 06.06.12, <http://www.lngworldnews.com/> (Last accessed 02.07.12).

⁴⁵ International Gas Union, 'World LNG Report 2011' <http://www.igu.org/> (Last accessed 02.07.12)

⁴⁶ LNG World News, 'Malaysia Lloyd's Register Launches FLNG Rules', 06.06.12, <http://www.lngworldnews.com/> (Last accessed 02.07.12).

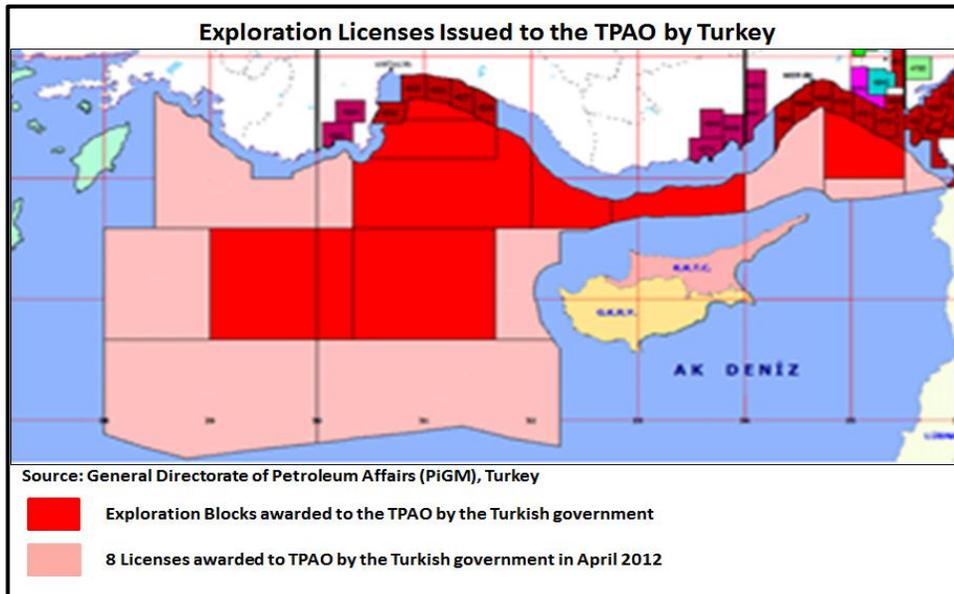
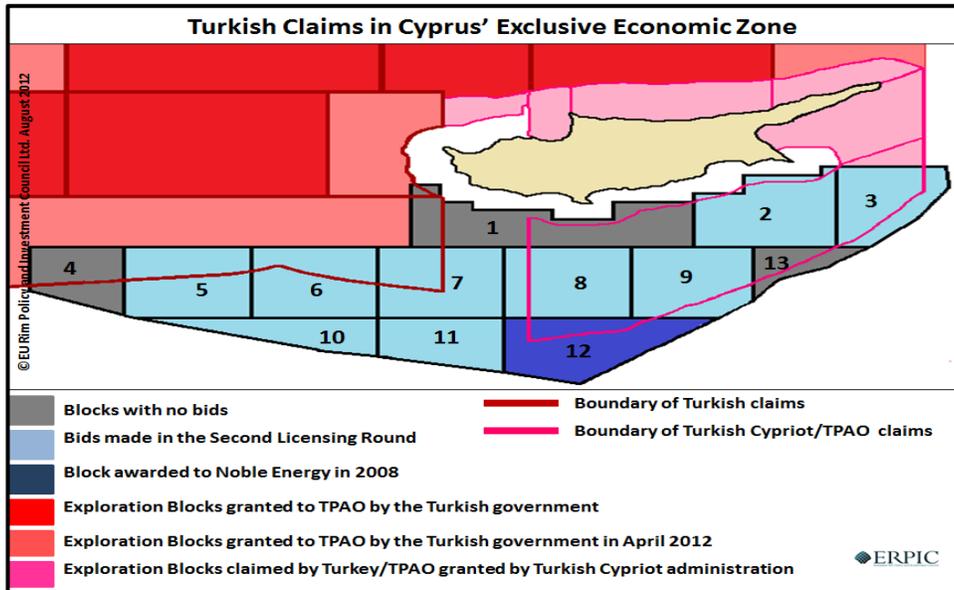
⁴⁷ International Gas Union (IGU) 'World LNG Report 2011' <http://www.igu.org/> (Last accessed 02.07.12).

⁴⁸ Upstream Online, 'Prelude FLNG to cost \$3bn', 01.06.11, <http://www.upstreamonline.com/> (Last accessed 02.07.12).

⁴⁹ Shell Homepage – News and Media Releases, 'Shell floating LNG technology chosen by joint venture for Greater Sunrise project', 29.04.10- <http://www.shell.com/> (Last accessed 02.07.12); Penn Energy 'Technip, Daewoo win FEED contract on PETRONAS' FLNG vessel offshore Malaysia', 01.02.12 <http://www.pennenergy.com/> (Last accessed 02.07.12); Technip Homepage – Press Releases, 'Technip awarded a key engineering contract for a FLNG in Malaysia', <http://www.technip.com/> (Last accessed 02.07.12); Shell Australia Homepage – 'Prelude', <http://www.shell.com.au/> (Last accessed 02.07.12); Reuters, 'Inpex delays Indonesia LNG output start by 2 years', 21.12.10, <http://uk.reuters.com/> (Last accessed 02.07.12).

⁵⁰ Bloomberg, 'Erdogan Threatens to Blacklist Companies Working With Cyprus on Oil, Gas' – Emre Peker, 22.09.11, <http://www.bloomberg.com/> (Last accessed 02.07.12).

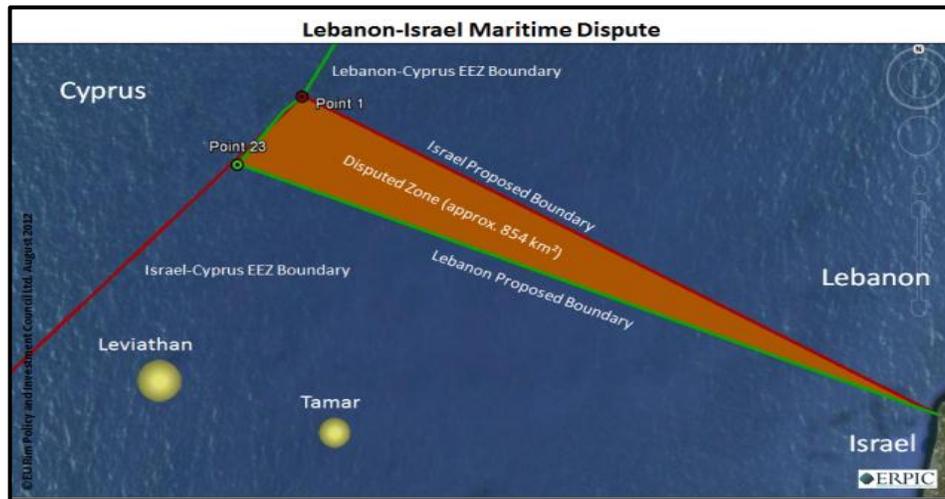
In a similar vein, in April 2012, Turkey awarded eight new licenses to TPAO in the Eastern Aegean in an area where sovereignty is disputed with Greece. Turkey, in support of its claims, has also deployed warships in Cyprus' territorial waters on several occasions.⁵¹



In 2007, Lebanon and Cyprus signed a delimitation agreement, and in 2010 Israel and Cyprus also agreed a maritime border. Lebanon then failed to ratify the 2007 agreement, arguing that it was the starting point for negotiations and claiming its maritime border extended further south than the agreed point. Lebanon and Israel have different ideas of where the maritime boundary between the two states lies. The difference is a pie-shaped area of 854 km² (330 mi²) in size where their declared EEZs overlap. In 2010, Lebanon submitted its proposed maritime boundary to the UN. Israel submitted its view to the UN in 2011. U.S. and UN diplomats have been

⁵¹ International Crisis Group, 'Aphrodite's Gift: Can Cypriot Gas Power a New Dialogue?', 02.04.12, p.5., <http://www.crisisgroup.org/> (Last accessed 02.07.12); Today's Zaman, 'Turkish Warships head towards Cyprus in oil exploration dispute', 21.09.11, <http://www.todayszaman.com/> (Last accessed 02.07.12); Haaretz, 'Turkey to deploy warships over gas dispute with Cyprus', 25.09.11, <http://www.haaretz.com/> (Last accessed 02.07.12).

trying to resolve the issue, and in June 2012 reports indicated that diplomats were willing to acknowledge Lebanon's rights to control 530 km² (204mi²) of the disputed area.⁵² However, there is no official agreement between Israel and Lebanon settling the dispute.



For Lebanon to move ahead with the establishment of a hydrocarbon industry, a functioning energy authority (tentatively named the Petroleum Administration) must first be formed by the government. There are questions within Lebanon itself about whether such a body will be able to work without interference from the country's political groups. Lebanon has commissioned offshore seismic surveys to be carried out in its offshore territory, and aims to hold its first licensing round in the end of 2012.⁵³

In this context, the developments in Syria could have severe effects on Lebanon. Syria maintained a strong military presence in Lebanon during the years 1976 - 2005. Syria has remained very influential in Lebanese affairs since its military withdrawal in 2005 through its local allies, notably the two main Shia movements, Hezbollah and Amal, and their network of Lebanese partners in different communities.⁵⁴ Lebanese political life is divided over the issue of Syrian influence with the Sunni-based "March 14 Alliance", headed by Rafik Hariri's son Saad, opposing Syrian influence. Its rivals, the Shia-dominated "March 8 Coalition" headed by Hezbollah, are strong allies of Assad's regime in Damascus. If the Syrian regime (based on the Shia-offshoot Alawite minority) collapses and the Sunni majority takes over, Hezbollah's lifeline to its Iranian patrons may be severed, leaving the movement weakened both in Lebanon and vis-à-vis Israel.⁵⁵

A NEW EAST-WEST ENERGY CORRIDOR TO EUROPE

Given the political instability, the concept of an energy corridor that would link Israel and Cyprus to Southern Europe, will face several difficulties for the immediate future. While Israel may currently be looking towards Asian energy markets, a firm linkage to the European market backed by European financing could still be very attractive as China is known for sitting on considerable shale gas reserves.

⁵² Naharnet, 'Lebanon Recovers 530 Square Kilometers of its EEZ', 06.06.12, <http://www.naharnet.com/> (Last accessed 29.06.12).

⁵³ Interfax Energy, 'Beirut prepares first offshore licensing round' 19.06.12, Volume 2, Issue 113, p. 6, www.interfaxenergy.com (Last accessed 02.07.12), Interfax Energy, 'Lebanon to issue RFP on floating LNG by the end of the year' 11.09.12, Volume 2, Issue 172, p. 8, www.interfaxenergy.com (Last accessed 12.09.12).

⁵⁴ BBC News, 'Syria: The view from Next Door', 29.11.11, <http://www.bbc.co.uk/> (Last accessed 02.07.12).

⁵⁵ BBC News, 'Syria: The view from Next Door', 29.11.11, <http://www.bbc.co.uk/> (Last accessed 02.07.12).

Exporting LNG to the EU via Cyprus would give Israel direct access to the European internal market, and make it part of European energy security. As such, the relationship between Israel and Cyprus is key. However, a bilateral relationship between Israel and Cyprus must be based on a common vision, not only on the exploration of natural resources. It is important that the two countries establish a relationship based on partnership rather than dependency. Positive moves have been made in this respect as Israel and Cyprus are progressing in their energy talks.⁵⁶

Cyprus' options for transporting its energy to Europe include: the construction of an underwater pipeline linking Israel, Cyprus and Greece; an electricity cable linking the three countries and, by extension Europe; and the construction of an LNG facility in Cyprus to serve Cyprus', as well as Israeli natural gas exports to Europe.⁵⁷ Cyprus' decision to construct a liquefaction facility available to Israeli natural gas has important consequences. In view of the high cost and value of such major energy and infrastructure projects, national policy and security considerations figure prominently in what might otherwise be a private sector initiative. The energy resources on both sides of the Israeli-Cyprus maritime border are, and will be, under license to corporations with their own economic, even political agendas. Irrespective of who hold such licenses, and/or other major energy assets, however, Cyprus, as a host state will become responsible for the security of the energy exploration production and supply chain. Where energy and national security are concerned serious risk analyses will need to be part of the overall plan.⁵⁸ In order to develop into a reliable LNG producer and supplier, Cyprus must be able to ensure the security of the huge investments that will be required. Being a small country with a small armed forces, Cyprus can do this more cost effectively with Israeli cooperation and assistance.

Given the obvious advantages of having a secure source of energy, it would be in Europe's interest to be fully involved in the development of the natural gas resources of the Eastern Mediterranean. It is, therefore, strongly suggested that a new energy route from the Eastern Mediterranean to Europe should become a European sponsored project. Of course, each option would have to be costed in detail, examined for risk and economic returns.

The idea of an underwater pipeline from Cyprus to Greece, the "*Eastern Mediterranean Pipeline*", has received much publicity in Greece as a way to salvage the non-Turkish section of the Italy-Turkey-Greece Interconnector ("*ITGI*").⁵⁹ In February 2012, the Shah Deniz consortium announced that it would favor the Trans Adriatic Pipeline ("*TAP*") over the ITGI as the preferred leg of the route to Europe.⁶⁰ Greece maintains that the Eastern Mediterranean Pipeline is feasible both economically and technically despite requiring to be laid at depths over 2,000 meters. In addition, the project has to run through waters disputed by Turkey, and that

⁵⁶ Cyprus Mail, '*Details of Israel energy deal are being fleshed out*', 13.06.12, <http://www.cyprus-mail.com/> (Last accessed 02.07.12).

⁵⁷ Cyprus Mail, '*Details of Israel energy deal are being fleshed out*', 13.06.12, <http://www.cyprus-mail.com/> (Last accessed 02.07.12).

⁵⁸ Energy Security Journal, '*Closing the Gap Between Energy and National Security*'- Kevin Rosner, December 2011 Issue, <http://www.ensec.org/> (Last accessed 02.07.12).

⁵⁹ Natural Gas Europe, '*Cyprus Opts for LNG Terminal for Offshore Gas*', 11.06.12-<http://www.naturalgaseurope.com/> (Last accessed 02.07.12).

⁶⁰ Natural Gas Europe, '*Analysis: TAP's Victory Attributed to Wider Geo-economic Considerations*', 21.02.12, <http://www.naturalgaseurope.com/> (Last accessed 02.07.12).

without extensive infrastructure investments into the Greek transmission system, the gas would not be able to be transported to other markets. The last point is related to the fact that Greece's ability to access the rest of Europe will, to a large extent, depend on pipeline projects which essentially lie outside Greece's control.

Alternatively, it has also been suggested that gas from Cyprus could be exported to Turkey via a pipeline that would form part of the Southern Corridor.⁶¹ However, this option is a non-starter without the prior full normalization of Cyprus-Turkey relations.

LNG projects are not only more costly than pipeline projects, they also take longer to implement. It has been suggested that a 5 mtpa liquefaction plant would take approximately 10 years to construct once the final decision has been made.⁶² However, this option would give Cyprus more flexibility for exporting its own reserves, as well as provide an export option to its neighbors. There are several LNG regasification terminals in the Mediterranean that could serve as entry points into Europe. Although most of these terminals are currently contracted to work at close to capacity, by the time Eastern Mediterranean gas comes online, circumstances may be different, and sufficient receiving capacity may be available.

The relations between Cyprus and Greece are historically good, and Greece has one LNG regasification terminal located on the island of Revithoussa with a capacity of approximately 5.2 bcm/year.⁶³ In 2011, Greece imported close to 1 million tons ("mt") of LNG (approximately 1.38 bcm).⁶⁴ While these figures are unlikely to remain the same over the next 10 years, Greece will still have to invest in its national transmission system if the gas is going to be transported beyond its borders. In this context, any future expansion of Cyprus' liquefaction facility and export capacity to 10, or even 15 mtpa, would also require Greece to either extend the Revithoussa terminal and/or construct a new terminal, like the one planned in the south of Primos (near Kavala).⁶⁵ In the current economic crisis, it is doubtful that Greece will be able to undertake the commitments, or attract the investors needed for the expansion of its national pipeline grid and the Revithoussa Terminal in the near future. To make matters worse DEPA may soon be forced to take loans in order to cover the cost of gas imports. DEPA, which is currently in the process of being privatized, reportedly owes approximately €120 million to various gas suppliers, including Gazprom, BOTAS and ENI.⁶⁶

In order to establish itself as a reliable energy supplier to Europe, Cyprus needs to adopt a broader EU oriented LNG export policy. Such a policy should include export to the existing LNG import terminals across Southern Europe as well as to Greece. Italy, one of the largest consumers of natural gas in the EU⁶⁷, has two LNG regasification terminals in operation, with several import terminals planned over the coming years.⁶⁸ There are

⁶¹ International Crisis Group, 'Aphrodite's Gift: Can Cypriot Gas Power a New Dialogue?', 02.04.12 <http://www.crisisgroup.org/> (Last accessed 02.07.12).

⁶² ERPIC Video Presentations, 'Constructing the Vassilikos LNG Plant: Questions of Feasibility, a Reality Check, 11.09.11, Peter Wallace, www.erpic.org; 'Cyprus Gas: A View on the Short and Long-Term Alternatives and Options', 11.01.12, Peter Wallace, www.erpic.org (Last accessed 20.08.12).

⁶³ DESFA Hellenic Gas Transmission System Operator Homepage - <http://www.desfa.gr> (Last accessed 02.07.12).

⁶⁴ International Gas Union 'World LNG Report 2011' <http://www.igu.org> (Last accessed 02.07.12).

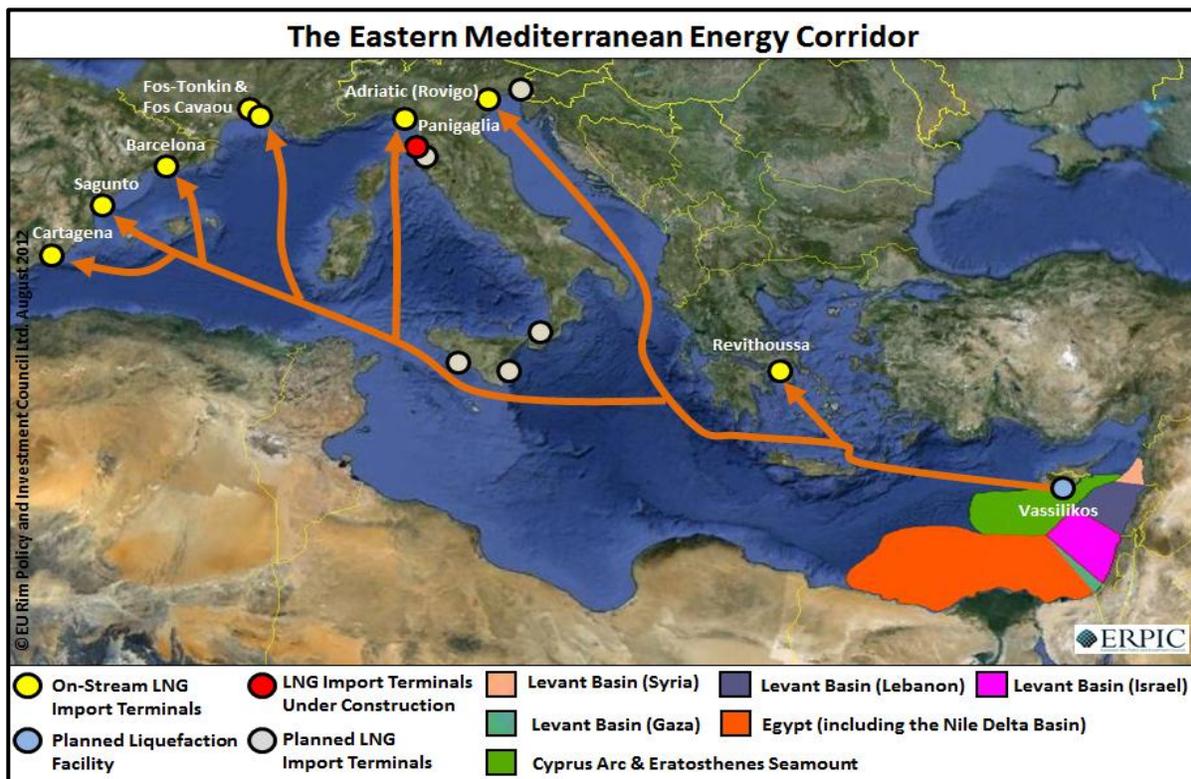
⁶⁵ Interfax Energy, 'Europe breathes a sigh of relief after Greek elections', Volume 2 Issue 113, 19.06.12, www.interfaxenergy.com (Last accessed 02.07.12).

⁶⁶ Natural Gas Europe, 'DEPA May Take Loan to Pay for Gas', 11.06.12, <http://www.naturalgaseurope.com/> (Last accessed 02.07.12).

⁶⁷ Italy imported 69.5 bcm of natural gas in 2011 making it second to Germany with a total import of 84 bcm. BP Statistical Review of World Energy June 2012 - 'Natural Gas Section' <http://www.bp.com/> (Last accessed 02.07.12).

⁶⁸ BP Statistical Review of World Energy June 2012 - 'Natural Gas Section' <http://www.bp.com/> (Last accessed 02.07.12).

also plans for expansions of existing terminals. The terminal closest to Cyprus is the Adriatic (Rovigo) LNG Terminal located in the northern part of the Adriatic Sea with a current capacity of 8 bcm/year⁶⁹, and the Panigaglia LNG Terminal, located on the North Western coast of Ligurian Sea with a current capacity of 3.5 bcm/year.⁷⁰ Italy imported 8.7 bcm of LNG in 2011, making it the fourth largest LNG importer in Europe.⁷¹ While it is unlikely that all the planned projects will materialize, Italy will undoubtedly remain a dominant force on the European natural gas import market. The Fos-Tonkin and Fos Cavaou Terminals in southern France with receiving capacities of 5.5 bcm/year⁷² and 8.25 bcm/year⁷³ respectively are also options to consider. France imported a total of 14.6 bcm of LNG in 2011 making it the third largest LNG importer in Europe. With an LNG import of 24.2 bcm, Spain was the second largest LNG importer in 2011. Spain has three import terminals on its eastern coast, the Cartagena Terminal (11.8 bcm/year⁷⁴), Sagunto Terminal (8.7 bcm/year⁷⁵) and the Barcelona Terminal (17.1 bcm/year⁷⁶).



Cyprus' geographical position grants it access to the largest natural gas consumers and LNG importers in Europe. As such, The *Eastern Mediterranean Energy Corridor* should be able to reach all EU entry points in the Mediterranean in order to facilitate multiple end-users across Europe. In this context, it should be noted that several major EU energy companies have participated in Cyprus' second licensing round, therefore,

⁶⁹ Adriatic LNG Homepage – ‘The Adriatic LNG Terminal: Fact Sheet’, <http://www.adriaticlng.com/> (Last accessed 02.07.12).

⁷⁰ Eni Homepage – ‘Gas Transmissions’, <http://www.eni.com/> (Last accessed 20.08.12).

⁷¹ BP Statistical Review of World Energy June 2012 – ‘Natural Gas Section’ <http://www.bp.com/> (Last accessed 02.07.12).

⁷² Gaz Suez Homepage – ‘LNG Terminals’, <http://www.gdfsuez.com/> (Last accessed 20.08.12).

⁷³ Gaz Suez Homepage – ‘LNG Terminals’, <http://www.gdfsuez.com/> (Last accessed 20.08.12).

⁷⁴ Enagás, S.A. Homepage – ‘Regasification Terminals’, <http://www.enagas.es/> (Last accessed 20.08.12).

⁷⁵ Saggas Homepage – ‘Technical file’, <http://www.saggas.com/> (Last accessed 20.08.12).

⁷⁶ Saggas Homepage – ‘Technical file’, <http://www.saggas.com/> (Last accessed 20.08.12).

creating the possibility that they will become stakeholders in Eastern Mediterranean gas.⁷⁷ In conclusion, their influence over EU policy makers could prove important.

Eastern Mediterranean LNG could, of course, reach broader global markets as well. With regard to global LNG transportation, and regasification capacity, it is important to note that by the end of 2011 global LNG fleets stood at 360 vessels, which is an increase of 150% since 2006. Global regasification capacity has increased by 64% since 2006 and in 2011 it stood at 608 mtpa.⁷⁸ In the same year the global LNG trade grew by 8 % (17.7 mt) to a total of 241.5 mt. This was mainly due to an increased demand from Japan (8.2 mt). There was also an increase in demands from the UK (4.4mt), India (3.4 mt) and China (3.3 mt).⁷⁹

CONCLUSIONS

The success of an *Eastern Mediterranean Energy Corridor* to Europe would depend upon a strong bilateral relationship between the State of Israel and the Republic of Cyprus. Support from Greece, Italy, as well as other Southern European countries will be important in securing a commitment from the European community to help develop, and ultimately purchase Eastern Mediterranean natural gas. Initially, Italy, rather than Greece, would likely be the optimum target entry point into Europe, followed by France and Spain. Greece should, however, not be excluded from the equation, nor should other entry points into Europe.

As an initial step, Cyprus and Israel should explore the economic, political and security aspects of jointly accessing the European energy market within the broader context of an Israel-Cyprus-Greece-Italy energy nexus. At the same time, Cyprus should seek EU Commission support for this project and submit a proposal before the European Council.

By helping develop the Eastern Mediterranean energy resources, and particularly the Cyprus fields, the EU would secure a substantial new supply of natural gas within its own borders. Israeli resources also, to the extent that they would be earmarked for Europe, would represent a secure and dependable source of energy for Europe.

An *Eastern Mediterranean Energy Corridor* would also decrease EU dependency upon non-member transit states. The *Eastern Mediterranean Energy Corridor* should, therefore, not be seen as a competitor of existing energy supply routes to Europe. On the contrary it should be viewed as complimentary to Europe's overall efforts to diversify and secure its energy supplies. This is very much in Europe's best interests, and will secure a considerable percentage of Europe's energy supplies for years to come.

⁷⁷ For a list of these companies see footnote 34 above.

⁷⁸ International Gas Union, 'World LNG Report 2011' <http://www.igu.org/> (Last accessed 02.07.12).

⁷⁹ International Gas Union, 'World LNG Report 2011' <http://www.igu.org/> (Last accessed 02.07.12).



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