



**Center for Energy &  
Contemporary Turkey  
Program**

# **Offshore Gas in East Mediterranean: From Myth to Reality**

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## Introduction

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The wave of deep offshore and unconventional gas and oil exploration projects, rendered economically feasible by relatively high prices and new technologies, has reached the shores of the Mediterranean. Levantine countries, including Cyprus, Israel, Palestinian Territories, Lebanon, Syria, have new offshore gas potentials.

A few years ago, the East Mediterranean energy situation looked gloomy. East Mediterranean countries, struggling to feed their growing domestic energy consumption, were forced to depend on neighbours like Egypt whose export gas pipeline kept on blowing or Syria which was unable to fulfil the export contracts it signed and they meanwhile had to buy LNG at world markets high spot prices or fuel their power stations with highly priced fuel oil or diesel. Long term prospects did not look good either as the ability of Egypt -the main regional supplier- to maintain gas export's volumes is being challenged by rising domestic demand. Israel in particular, given its tense relations with energy rich Arab countries was finding itself in a difficult situation to secure its supplies. The discoveries of giant gas fields offshore Israel, now followed by its neighbours who all started to explore their offshore, has changed the picture. Gas fields have provided these countries a great feeling of blessing as expected economic benefits will be massive and energy security improved – a major concern after Arab Revolutions have shaken established energy routes.

The road leading to a change of energy paradigm in the East Mediterranean is however long and bumpy. Before these countries will be able to tap benefits from these deep water gas (and oil) resources, these countries will actually have to overcome significant geopolitical, regulatory and commercial hurdles. Energy laws and clear and attractive legal frameworks for exploration and production activities, will need to be set up, and sometimes from scratch. Infrastructures –so far almost inexistent- will have to be financed and built. All of this will be necessary to ensure the fields' development projects can be viable. East Mediterranean countries' ability to convert the try will also probably rely on the politics of the region, which may not prove so promising given the revived tensions on historical border issues against a backdrop of escalating conflicts fuelled by Arab revolutions in the Middle East.

Challenges are common to all Levant countries, and they are geographically all sharing the neighbourhood of both Turkey and the European Union. Yet every country finds itself in a different situation: they have different resources and they have reached different development stage. In other words, timing, national governance and gas use and export possibilities differ.

New east Mediterranean gas discoveries also sheds a new light on Turkey, both as regard its gas resource's potential in the Mediterranean and the potential of northern Cyprus and as it interplays with Turkey's past years foreign energy policy of consolidating itself as the transit country to South Eastern Europe.

This note addresses this situation. It will draw a state of the art on offshore fields' development across the Levantine basin. It will assess the domestic gas needs and prospects for export, as well as the advancement of legal frameworks. It will reflect briefly on geopolitical implications.

This note is the first study, and the background paper, of a larger research project on the "New Energy Paradigm in Eastern Mediterranean". The note will be completed by a following paper on potential export markets for East Mediterranean gas. The project will also include a briefing paper on Turkey renewed foreign policy, and several country notes on energy governance and domestic politics. The project is conducted jointly by Ifri Turkish Research Programme and Ifri Centre for Energy.

## New offshore gas resources in the Levantine Basin: from Myth to Reality

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Part of the new gas discoveries' credit has to go to Israel, who launched the move in the course of its tireless search for oil and gas. The country discovered the game changer gas field, for which licenses were given back in 1999 and indefinitely extended until the first discovery was made ten years later, in 2009. One year later and a few miles further off the coast, it discovered the giant gas field Leviathan, which definitively locked in international interest for offshore exploration in the region.

In March 2010, the US Geological Survey assessed the whole Levantine basin, a geological formation which encompasses the offshore sections of the Mashrek countries (Lebanon, Syria, Israel and the Palestine Territories). It concluded that this offshore section holds around 3450 bcm of gas, around 3 billion barrels of natural gas liquids about 1.7 billion barrels of oil.<sup>1</sup>

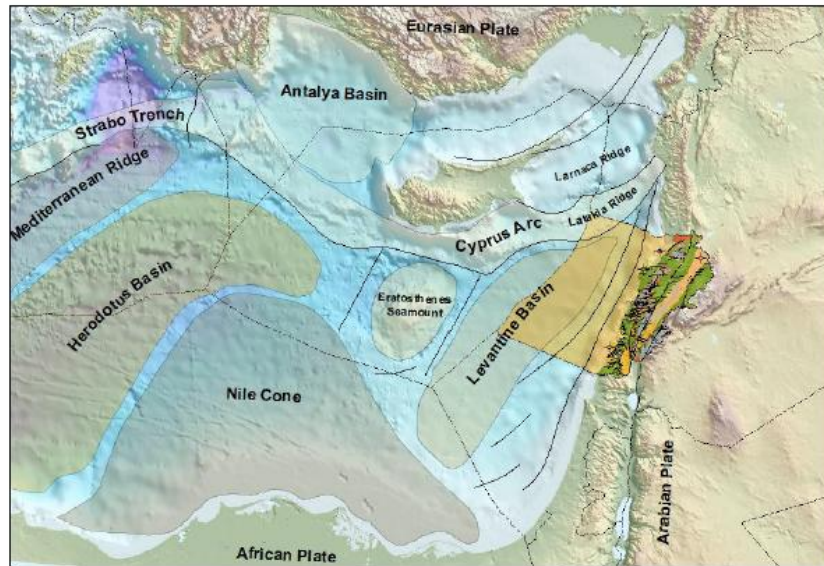
The successful exploratory drilling of the Israeli Tamar field one year before, and the following discovery of Tamar, further east in Israeli waters a few months later, gave additional credit to the report. Since then all countries of the region stepped in, and started exploring their offshore.

The East Mediterranean region includes many different basins, as shown on map 1: the Levantine basin per se, the Cyprus arc which extend into the Latakia ridge offshore Syria, and the Lacarna ridge offshore northern Cyprus and Syria. Further west and offshore Turkey is the Antalya basin, and further south the Nile delta basin offshore Egypt. Levant countries are understood in the historic sense (i.e. Syria, Lebanon, as well as Israel, the Palestinian Territories and Jordan – extended to their “western door”, Cyprus), after which the “Levantine basin” was named.

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<sup>1</sup> Please refer to the USGS study, March 2010, Assessment of Undiscovered Oil and Gas Resources of the Levant Basin Province, Eastern Mediterranean available at <http://pubs.usgs.gov/fs/2010/3014/>

**Map 1: Geological Basins in the Mediterranean Sea**



Source: Lebanese Ministry of Energy and Water, 2012

These major discoveries have raised enthusiasm across formerly poor energy countries of the Levant. Gas fields have been subsequently named after Gods and monsters from the bible. To put however things into perspective, **these reserves are marginal compared to global gas players resources**. They can be compared to the North Sea proven reserves or the proven reserves of neighbouring countries: Algeria has 4.5Tcm of proven gas reserves, and Egypt holds 2.2 Trillion cubic meters (Tcm) of proven reserves (the USGS estimates that the sole Nile delta holds an additional 6.3Tcm of gas and 6 billion of condensates). These significant discoveries pale in front of the reserves of traditional gas producers such as Russia (more than ten times the amount), or Qatar (25.3Tcm) and in front of new discoveries in East Africa. Similarly the probable oil reserves are nothing compared to Saudi Arabia 264 billion barrels, the potential of Venezuela, or Libya proven 46.7 billion barrels of oil.

Additionally, the Levantine estimates of the USGS are not yet all proven nor are recovery factors -the amount of oil and gas that can be successfully extracted at present technology state of play and economic costs - known for the discovered fields. The USGS estimates the undiscovered resources technically recoverable gas and these reserves lie at depth of more than 1000m under water.<sup>2</sup>

<sup>2</sup> Technically recoverable resources represent that proportion of assessed in-place petroleum that may be recoverable using current recovery technology, without regard to cost. Proven reserves are those reserves claimed to have at least a 90% chance of being recoverable under existing economic and political conditions, with existing

This means that the probability of extracting these resources is still uncertain. For instance, the Leviathan gas field was believed to hold 600 million oil barrels, but the first appraisal drilling pushed that probability further in deeper layers and with lower estimates.<sup>3</sup> The presence of oil or natural gas liquids is actually pivotal in the project development costs. So far only Israel and Cyprus have made exploratory drilling which only covered part of their offshore sections, and can therefore claim to have proven reserves.

The new discoveries in the Levant will therefore not act as global game changer, and they will require large investments. The impact in economic and energy geopolitics terms is however likely to be tremendous for Levant countries themselves, would they successfully manage to transform their potential resources into reality. East Mediterranean countries possess different volumes of gas, and have actually not reached the same field development stage. **Gas may not be so easily exported either.**

The following section assesses the reserve development stage of the Levant countries. Syria is also addressed as the country has long been the larger producer in the region. However the government strategy for exploration and production is now blocked due to the on-going civil war and prospects of future offshore gas discoveries are weak.

## *Israel's natural gas landscape*

Israel is believed to hold the larger share of the Levantine reserves (around 40%) but this has been recently disputed by the Lebanese government following a 3D seismic study offshore their coast. **The country is nevertheless the most advanced in terms of exploration and production.**

Israel has been looking for offshore gas for decades. The Israeli-American consortium, composed of Houston, Texas based Noble Energy Inc. and its partner Delek group has been developing offshore gas fields since 1998. It discovered the Noa field in 1999, today exhausted, and the Mari-B field in 2000 which is still providing a

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technology. Probable reserves are unproven reserves attributed to known accumulations and claim a 50% confidence level of recovery. Possible reserves are attributed to known accumulations that have a less likely chance of being recovered than probable reserves (usually a 10% certainty).

<sup>3</sup> In April 2013, Noble energy forecasts talked about a 25% average probability of finding two fields with 300 million barrels of oil in each one. In 2012, Noble halted the Leviathan 1 oil exploration drilling because the pressure was too high. The drilling is expected to recommence at the start of 2014 with a rig that specializes in deep drilling. (Source: Globes, April 2<sup>nd</sup> 2013 available at <http://www.globes.co.il/serveen/globes/docview.asp?did=1000833427&fid=1724>)



large share of Israeli domestic gas demand. The British Gas group also made a discovery offshore Gaza in 2000, but the 4 year field development plan approved by the Palestinian authority was finally blocked by the Israeli government. The real breakthrough occurred in 2009, when Noble Energy Ltd. discovered Tamar and the giant Leviathan in 2009 and 2010.

Map 2: Israel offshore gas fields



Source: Delek Energy quoted in AFP

These two gas fields were through to hold respectively 246 bcm and 509.4 bcm (18Tcf).<sup>4</sup> Initially, Tamar gas field size was over estimated, while Leviathan appears to be underestimated. Noble Energy's led consortium already conducted six appraisals wells and a 3D seismic study 2011 in Tamar<sup>5</sup>, and started production in April 2013; it has also conducted four appraisal well in Leviathan, raising its estimate to 520 bcm. Smaller fields were also discovered, like Dalit

<sup>4</sup> The initial USGS appraisal was raised since the drilling appraisal work took place. Initially Tamar was believed to have 237 bcm (8-9 Tcf) and Leviathan 480 bcm (17-20 Tcf). Noble raised the Leviathan estimate up to 509.4 bcm in March 2012 following a successful fourth drilling appraisal, and further drilling work is taking place. Source: <http://interfaxenergy.com/natural-gas-news-analysis/middle-east/noble-ups-estimates-for-leviathan-to-520-bcm/>

<sup>5</sup> Source : <http://www.offshore-technology.com/projects/tamar-field/>

discovered by Noble in 2009 (14 bcm), Dolphin (2.3 bcm) and Tanin (31 bcm) also by Noble in 2011 and February 2012 and more recently the Shimshon field (7-15 bcm) by a consortium led by ATP oil and gas (a Texan company). In November 2011, Israel Natural Gas Authority Director-General, Yehosua Stern, estimated Israel total gas potential to be 1Tcm; since 2012, Noble Energy tables on 2.53 Tcm. The Israeli government resources estimates also vary between 1.4 Tcm and 2.324 Tcm, of which 800bcm have already been discovered.<sup>6</sup>

In total, the country's gas reserves are grossly comparable to these of Oman (0.8 Tcm), Lybia (1.2 Tcm) or the Netherlands (1.5 Tcm).

**Table 1: Israel's natural gas reserves**

Reserve	Size of Resources*
Leviathan	480-509.4 bcm 425-594 bcm
Tamar	246 bcm
Tanin	31 bcm
Mari B	30 bcm
Shimshon	15.6 bcm
Dalit	14 bcm
Dolphin	2.3 bcm
Noa	1.3 bcm
Pinnacles	1.3 bcm
<b>Prospective resources known today</b>	<b>Approx. 680 bcm</b>
<b>Reserves and contingent resources</b>	<b>Approx. 800 bcm</b>
<b>Total natural gas supply (reserves, contingent resources and prospective resources)</b>	<b>Approx. 1,480 bcm</b>

Source: Natural Resources Administration, Israel's Ministry of Energy and Water Resources (Tzemach final report 2012), Apco Consultancy, Ifri  
 \*Resources include proven resources, probable resources and potential resources.  
 The recovery factor is not yet known for all fields.

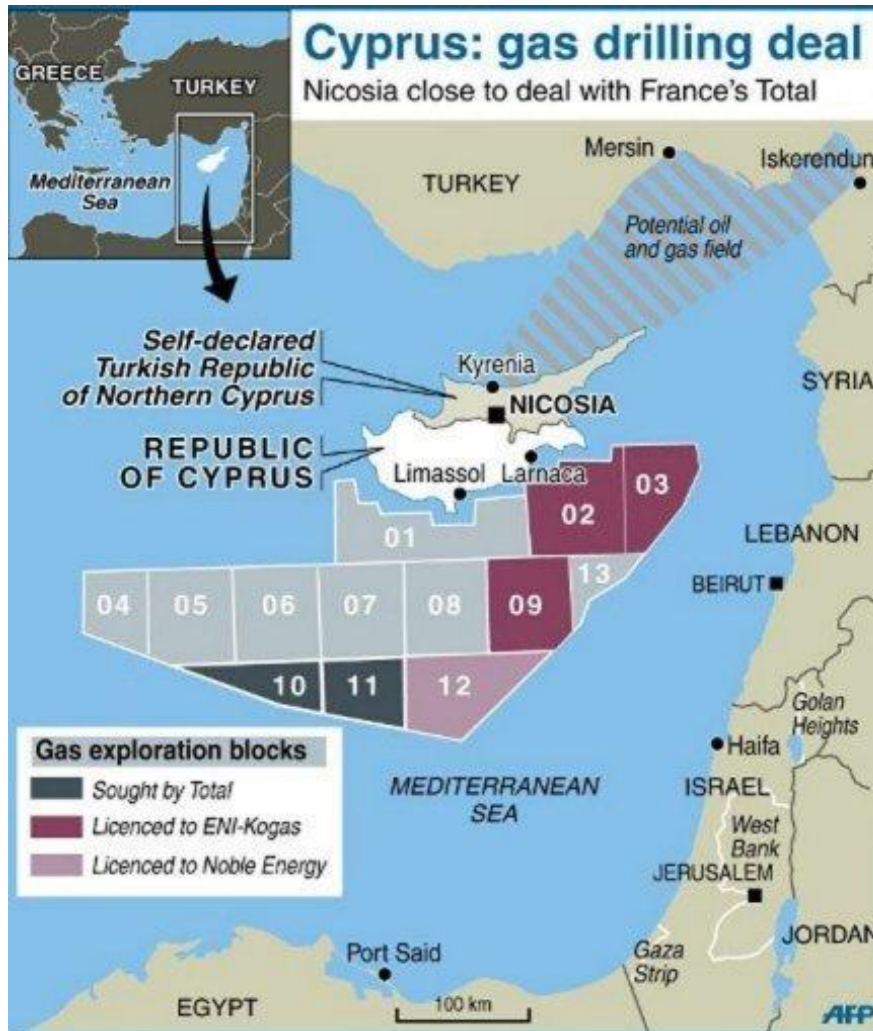
## ***Cyprus' natural gas landscape***

Cyprus has smaller reserves than Israel according to the USGS. The government has estimated reserves up to 1.132Tcm following the discovery of Aphrodite, and expects estimates to further increase to

<sup>6</sup> The Tzemach Committee, set up to frame Israeli energy policy as regard its resource use (among other the amount of gas kept and the share allowed for export) has revealed detailed expectation of the Israeli government estimates of total reserves or 1.4Tcm based on the USGS study. The Sheshinski committee, which calculated the government revenues to fix the tax threshold earlier on, estimated on the other hand Israeli reserves to be 2.324 Tcm i.e. two third of the reserves.

1.7Tcm after further appraisal wells will be drilled (i.e. around 40-60Tcf). These reserves are not yet proven and commercial viability is pending. The government expects to produce gas from 2017 on for the Cyprus market and by 2019 for export.

**Map 3: Cyprus Gas Drilling Deals**



Source: AFP (Agence France Presse) (Blocks 10 and 11 have now been licensed to Total).

The first call for tenders for exploration and production was launched in 2007. It was actually not very successful. Out of the three bids, only one was successful - Noble Energy's bid on the block 12 called "Aphrodite" (adjacent to Tamar) was successful. The first exploratory drill in September 2011 revealed 141 bcm of gas with a 75% probability, and 226 bcm of gas with a 25% probability. Noble also expects to find around oil in deeper layers. Following the first appraisal drill and the USGS study, a second licensing round was launched early 2012 and appears to be much more successful. Only two blocs, 1 and 4, contested by Turkey and thought to have a limited

potential did not receive any bids. Cyprus proceeded to the attribution of licenses for the blocks 2,3,9,10 and 11 which were attributed to an Italian-South Korean joint venture ENI-KOGAS, and Total.<sup>7</sup>

## ***Lebanon's natural gas landscape***

There are no gods' names for Lebanese offshore exploration blocks and they have hardly even been given a number so far. Lebanon is very late in terms of offshore gas exploration. In order to catch up with its neighbours the Lebanese government commissioned 2D and 3D seismic study off-shore its coast (see map 4 below). These revealed that the country offshore gas reserves may actually be higher than expected (around 2.2Tcm, i.e. higher than Cyprus and Syria's reserves). Furthermore, the Lebanese offshore may contain oil.<sup>8</sup> So far Israel and Cyprus gas fields are dry.<sup>9</sup> Already 70% of the basin has been covered by seismic data, and it appears that the Lebanese geology differs from its neighbours. According to spectrum which conducted the studies, Lebanese reservoirs are deeper, thicker and more mature than Israeli and Cyprus ones. Lebanese fields may contain around 460 to 675 million of barrels and 15 Tcm of gas.<sup>10</sup> If this proves to be the case, the development of Lebanese gas field could move faster than expected but will also require high capital and technology able firms.

Lebanon just launched its first licensing round, and around 97 international oil companies appear to be interested by the seismic study according to the Lebanese Ministry for Energy and Water, and up to 52 bidders were drawn in the tender process (among which Exxon Mobil, Chevron, and the National Iranian Drilling Corporation). Drilling is expected to take place at the end of 2015 and start the fields' development by 2016. Gas should therefore not be expected any time before 2020. The contractual framework for gas exploration and production is however far from complete.

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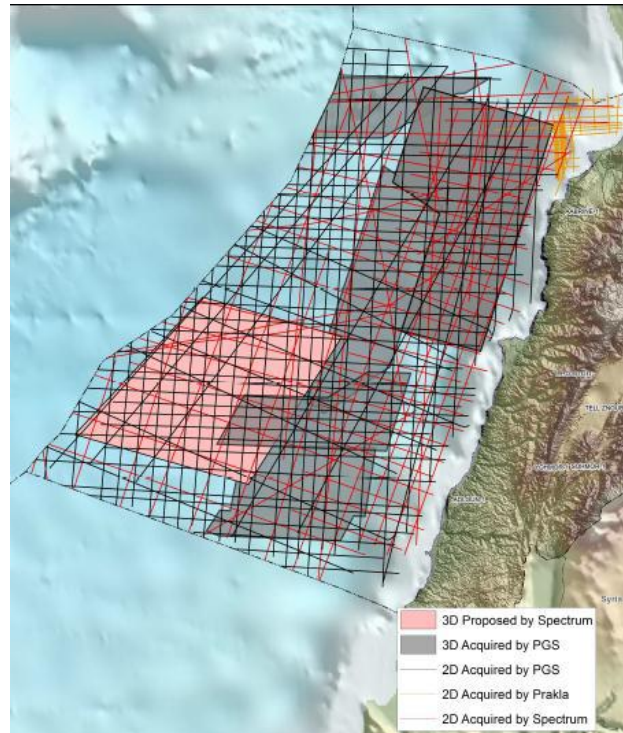
<sup>7</sup> A consortium made of Total-Novatek-GPB was initially negotiating block 9, but Cyprus government finally awarded the license to ENi-Kogas joint venture (source: <http://www.cyprus-mail.com/block-9/state-switches-bidder-block-9-negotiations/20121220>)

<sup>8</sup> Last month, Petroleum Geo-Services launched a seismic survey in December focused on locating petroleum reservoirs close to the lebanese coast. Completion dates are set between April and May 2013. (source: Daily star 17<sup>th</sup> January 2013 <http://www.dailystar.com.lb/Business/Lebanon/2013/Jan-17/202542-bassil-oil-prospects-off-lebanese-coast-can-reduce-energy-imports.ashx#axzz2PyXdggtL>).

<sup>9</sup> Levantine basin gas is biogenic gas, they is no oil associated with it. In Lebanon, oil might be present at deeper levels than gas fields. The country has therefore ordered a new seismic study to Ion Geophysical to assess deeper waters (4000m deep instead of 1200m so far).

<sup>10</sup> According to a study issued by Beicip-Franlap and IFP Energies Nouvelles (Source: Pétrole et Gas Arabe, 16<sup>th</sup> of April 2013)

**Map 4: Lebanese offshore seismic exploration**



Source: Lebanese Ministry for Energy and Water

## ***Syria's natural gas landscape***

Syria was the only country so far in the Levant to produce oil and gas, but its energy sector has been severely damaged by the war. The SPC, Syrian Petroleum Corporation, efforts to reverse declining oil and gas production have been reversed by the political turmoil.

Already back in 2005, a 2D seismic study was completed by CCG Veritas, in water depth ranging from 500 to 1,700m and in March 2011 a bidding round for three offshore blocks was announced by Syria's Ministry of Petroleum and Mineral Resources and the General Petroleum Corporation.<sup>11</sup> The country's offshore gas exploration, which could have developed faster given the already existing infrastructure and legal framework, has in particular been completely blocked by the war so far. In 1981 an offshore well was

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<sup>11</sup> This took part in the broader effort of SPC to promote gas and oil exploration in the country: In 2010, Total and Petrocanada had been awarded licenses in an oil bidding round and a shale oil bidding round, 60 miles south east of Aleppo had been announced in 2011 for 14 blocks with total shale oil deposits estimated at 285 billion barrels. (source: <http://www.eia.gov/cabs/Syria/pdf.pdf>)

drilled in the Iskenderun basin offshore Turkey and declared dry. Four wells were then drilled onshore east of Latakia by the Syrian Petroleum Companies. Three sedimentary basins, Levantine, Cyprus, and Latakia, have been identified from the seismic data, each with a unique structural and stratigraphic history.

**Map 4: Syria's offshore gas blocks**



Source: CCG Veritas

Syria has so far around 28bcm (1Tcf) proven reserves of natural gas in its eastern and central part, according to the Energy Information Agency. Syria produced around 8 bcm of natural gas in 2011 (down from 9.5bcm in 2010), 17% of which has been reinjected into its oil field so as to enhance production.

## ***Palestinian Territories' Natural Gas Landscape***

There is also gas offshore the Gaza strip. British Gas, the company which obtained first the Tamar license back in 1999, also invested in Gaza.<sup>12</sup> In 2000 BG discovered the Marine gas field (refer to map1) and finally invested up to \$50 million to drill Marine 1 and Marine 2. The Palestinian Authority had established a four year plan for the development of the field.

<sup>12</sup> BG dropped its Tamar license in 2006 after it failed to secure agreements to sell gas to the Israeli Electricity Company and following continuous blockage of its activity off-shore the Gaza strip. Avner, Isramco and Noble Energy then bought its stakes in Tamar before they finally discovered gas in 2009.

However Israel, first in favour of the exploitation of Gaza resources started to object the on-going developments after the Hamas was elected in 2006. It feared gas revenues would consolidate the Hamas and strengthen its relation with Egypt.

There are currently undergoing negotiation for the exploitation of the Mari B site and the Noa field which may be located at least partially into Palestinian borders, while Noa and Marine 3 could end up coming from the same field. In total, Palestinian proven reserves amount to 31.5 bcm, a small figure compared to Leviathan expected 500 bcm.

## An Outlook at Levant countries' gas strategies

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Each country disposes of different volumes of gas and types of reserves, Lebanon being probably oil gifted as suggested by recent seismic study. They have also developed their reserves at different path, Israel being clearly the most advanced country. Most countries also have to build regulatory frameworks for the exploitation of these resources, decide on the share left for exports and build physical infrastructure. In other words, they are now drafting more or less rapidly energy strategies.<sup>13</sup>

While Syria, a traditional oil and gas producer, may have benefited from a significant advance in this area, the further development of its resources is now completely halted by the civil war. The embargo put on oil exports is being soften since the government's opponents took control of some of the reserves, yet this is only to allow for short term revenues. This country is therefore not addressed in this part.

### *Israel's Strategy*

The Tamar and the Leviathan field discoveries in 2009 and 2010 dramatically changed the country's energy setting, as they will cover the country domestic gas needs. Israel was so far relying on pipeline imports from Egypt through pipe covering up to 40% of Israeli gas needs. The situation was becoming desperate. The country was threatened temporarily by Egyptian gas cuts following the Arab spring until the bilateral contract was finally breached in 2012. On the other hand, Israel faces the depletion of its own fields.<sup>14</sup> The country therefore had to increase expensive LNG imports in the meantime.

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<sup>13</sup> The issue of taxation and hydrocarbon revenues management will be addressed in separate country notes.

<sup>14</sup> The gas discovered at the Noa gas field in 1999 and the Mari-B field which hold combined reserves of 39.6 bcm, has been extensively used to fire gas power stations inland. The Mari-B field, currently the only producing field, contributed to much of Israeli domestic gas consumption since 2004 and is now depleted at 70%.



These gas discoveries now offer the country the perspective of becoming energy independent.

These discoveries will also boost the country's GDP growth. First, the domestic use of these resources would help to reduce the country expensive energy bill (about 11% according to the IEA). Secondly, the development of the gas fields will also help to develop the economy while gas exports will bring revenues. According to the Israeli Central Bank, natural gas will represent about one third of the country economic growth for 2013.<sup>15</sup> Production from Tamar which recently started will represent 1% share of GDP in 2013, and this share will increase by 3.8% in 2014. The current state expenditures will also be relieved by up to \$3 bln according to the Bank.

### **Domestic gas uses: good opportunity but not so obvious options**

Israel's energy policy has always been very different than other countries in the region because of the long standing Arab-Israeli conflict. Improving the country's energy security has therefore long been Israeli's successive governments' priority. They actively try to diversify their suppliers and to develop alternative energy sources, including renewables and even electric vehicles. In this respect, gas consumption, although lower than coal and oil, has been rising.

This move was also encouraged by rising oil prices, environmental concerns as regard the use of coal, the discoveries of small natural gas fields offshore and also, very importantly, good relations with Egypt. The country did not sleep on its acquis however. When disruptions of the Egypt- Israeli gas pipeline started Israel was securing deals to import LNG from Russia to compensate for its declining domestic gas production and concerns over the sustainability of Egyptian gas exports.

The discovered resources are able to cover the country's total energy consumption for years. Tamar reserves only amounts approximately to 40 years and the country total resources estimates

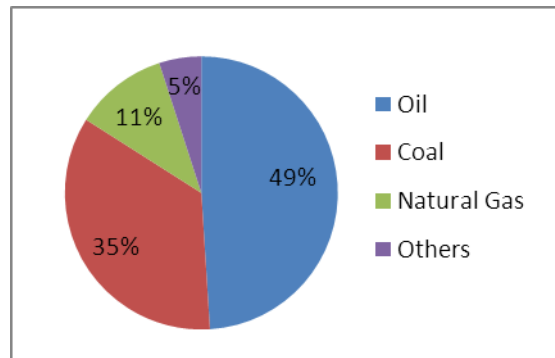
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<sup>15</sup> Using the US Energy Information Administration the current natural gas futures price of \$3.46 per MBTU, the estimated value of the 26 trillion cubic feet of estimated reserves in Israel's offshore fields developed by Noble Energy is worth approximately \$90 billion. That is equivalent to over 41% of Israel's 2010 GDP of \$218 billion. According to a Barclay's Capital Research report, Israel could add "net revenues from gas production will average 1.5 billion U.S. Dollars per year from 2016 to 2020, and 2.3 billion U.S. Dollars per year from 2022-2049." The impact on the country's GDP growth is significant. Natural gas is not the only energy source from the discoveries in Israel's Exclusive Economic Zones in the Levant Basin, there is oil in lower depths. UBS using Noble Energy estimates of recoverable oil of 4 billion barrels could result in Israel receiving almost \$60 billion in additional revenues, equivalent to 23% of Israel's GDP in 2010. (Source: New English Review)

amount up to 150 years of the country current gas consumption level. Experts estimate that these reserves would amount to 20-26 years of energy consumption, if all sectors (including the power sector and transport) were switched to gas.<sup>16</sup> The Tzemach Committee estimates that Tamar production will cover on its own from 50% to 80% of Israel gas needs until 2040. The first gas flew from Tamar in April, and Noble expects to produce 0.028bcm/d by 2013 -already twice the country daily consumption. The production of Leviathan could start by 2016.

Israel gas consumption is actually relatively low today. It covers 11% of the primary energy fuel mix and is mainly used for power generation (please refer to the graph below).<sup>17</sup> Coal has long been preferred to fuel the power sector, and it currently covers 35%, while oil which is mainly used for transport and peak demand power generators covers a higher share (49%).

**Figure 1: Israel's Primary Fuel Consumption**



Source: Library of Congress 2008

Switching the power sector to gas is so far the government priority, which plans to switch 75% of its power plants to gas by 2020.<sup>18</sup> In terms of cost effectiveness, the rational is however not clear-cut in the immediate short term. Indeed thanks to the American shale gas revolution, loads of coal has been flowed on global markets downplaying prices. Concerns about the price of electricity generation from domestic gas also appeared when Noble Energy was finalizing its contract with IEC (Israel Electric Corporation). Israel Public Authority actually reviewed the contract as it feared it would impact

<sup>16</sup> Financial Times quoting and Oxford Energy East Mediterranean Gas

<sup>17</sup> In 2010, 93% (which is 4082 mcm) of the total gas consumption was dedicated to transformation. The rest was used for the industry and energy sector, 205 mcm and 119 mcm respectively. Transformation includes the generation of electricity, while the demand from the 'Industry' refers to gas used for such things like the chemical-, iron and steel- and machinery industry. The demand from the 'Energy Sector' refers to gas used for the extraction of coal, oil, and gas and gas used in refineries, coke ovens and gas works

<sup>18</sup> The switch to gas by the power sector would add 0.8 Bcf to this number (0.67 bcf for coal displacement).

prices negatively as compared to Egyptian prices.<sup>19</sup> Furthermore the switch of the power sector to gas will require investments and will take time. Surely though, this will contribute to increasing the country security of supply.

Secondly, gas could be used in the transport sector. Since the Arab oil boycott in the early 1970s, finding reliable oil suppliers and developing alternative technologies for the transport sector has been a priority. The country for instance lately supported the development of electric vehicles. Fuelling transport with gas, and displace expensive oil, could actually be an interesting option in that perspective. Today, the country relies mainly on oil imports from the Caspian region via the ports of Haifa (for oil coming via tankers through the Bosphorus) and Ashkelon (for gas coming from the Turkish BTC terminal of Ceyhan), and is said to indirectly buy Arab oil.<sup>20</sup> The probability of an oil disruption is however to be qualified, the free passage through the Bosphorus strait is guaranteed by the 1983 Treaty of Montreux and Turkey would lose a lot of credibility attempting to block oil transit on its territory. Even in times of war, oil supplies are usually available. The gasification of the transport sector could help relieve the country trade balance as oil prices are increasing. This trend is observed in many gas producing countries. In the region, Egypt has long developed Compressed Natural Gas vehicles. The US more recently build on their shale gas revolution and start using LNG, Liquefied Natural Gas, for long-haul trucks, which prove to be quite economical. It should be however remembered that US gas prices are currently very low (Henry Hub prices stand below \$4/Mbtu). Finally, there are infrastructure costs attached to the gasification of the transport.

Last but not least, gas will be used by refineries. Gas is used as a cheap energy feedstock for refineries. Israel oil refineries have contracted 5.8 bcm to Tamar for 7 years with a contract linked to oil prices. The cost opportunity of gas varies from one sector to another. The use of gas in refining and petrochemicals definitely provides the best one. However, if Israel was to develop its refinery and petrochemical sector, it would face very strong competition by other MENA players which heavily subsidize their feedstocks, effectively dumping prices.<sup>21</sup>

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<sup>19</sup> Gas imports from Egypt are however not an interesting option anymore given the uncertainty surrounding the effective delivery of the gas, Egyptian own domestic needs in the longer term which is likely to compromise its export capacity, and the Egyptian government's call for higher prices as a condition to resume gas exports to neighbouring countries.

<sup>20</sup> Turkey imports 51% of its oil from Iran, 12% from Russia, 7% from Kazakhstan, as well as 17% from Iraq and 11% from Saudi Arabia (EIA, April 2013).

<sup>21</sup> To compare, Saudi Arabia currently sells ethane to its refineries at \$0.75 (Source: WoodMackenzie Report). Subsidising feedstocks or domestic energy prices in general is barely a good policy option in the long term though. Egypt which followed that path is now facing a serious gas crunch.

In this respect, further gas demand will be first be strongly interlinked with power consumption. The country gas consumption is expected to double by 2015 (from 0.31 bcf to 1bcf or 0.008 bcm). The Israeli Ministry of Energy and Water forecasted demand up from 5.2 bcm in 2010 to 12.5bcm by 2020, and 18 bcm by 2030. In total, the Tzemach committee estimated that Israel will consume of 495 bcm up to 2040, or 455bcm excluding transport.<sup>22</sup> In the longer term, gas can be used for oil shale exploration (enhanced recovery techniques). Israel also now wishes to develop the Shlefa basin onshore, which could contain 260 billion barrels of oil in shale formation (i.e. oil shale).<sup>23</sup>

### **Exporting gas: A challenging route**

Israel is the most advanced Levant country in terms of exploration and production, yet exporting its natural gas resources and finding routes for export proves quite challenging even more so as the country has currently no export gas infrastructure.

Uzi Landau, the former energy minister, considered exports possible to neighbour countries, such as Jordan or Palestinian Territories. Jordan suffers from repeated disruptions on the Egyptian gas pipeline, and has received only 25% of the gas volumes contracted. Israeli gas could feed the Arab Potash Company complex by extending the pipe that links to Sedom on the Red Sea. Yet in March 2013, the Jordanian Arab Potash Company denied undergoing negotiations with Noble Energy despite declarations of the Jordanian minister for Energy and mineral resources, fearing they would confront islamist movements and further opposition.<sup>24</sup>

Egypt is also becoming a gas importer. Egyptian gas consumption grows by 7% each year, and the country suffers from delays in developing its Delta Nile basin and offshore gas resources. From mid-2015, Qatari Gas will be imported to Egypt. Imports of Israeli gas however appear difficult given the political turmoil.<sup>25</sup>

Israeli gas could also be exported to Europe via Turkey. Turkish gas consumption is rising fast, so the country will also need additional imports by 2020. The two countries initially planned an energy partnership, as Israel was looking to diversify gas imports and buy gas from Russia. In 2007 the two countries were discussing the building of an energy corridor between Ceyhan and Haifa, which would have included five separate underwater pipelines for oil, natural

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<sup>22</sup> Tzemach Committee's final report available at : <http://energy.gov.il/English/Subjects/Natural%20Gas/Documents/pa3161ed-B-REV%20main%20recommendations%20Tzemach%20report.pdf>

<sup>23</sup> Oil Shale should be starting production by 2017, simultaneously with Leviathan planned production.

<sup>24</sup> Pétrole et Gaz Arabe, 1<sup>er</sup> Mars 2013

<sup>25</sup> Source : <http://www.reuters.com/article/2013/04/10/egypt-qatar-gas-idUSL5N0CX0SD20130410?feedType=RSS&feedName=rbsEnergyNews&rpc=43>

gas, water and communications. Map 5 shows the Turkish-Israeli planned corridor, and how it could link into regional pipeline feeding Europe. The downturn in Israel-Turkey relations in 2009 closed this possibility.<sup>26</sup> Following US president Barack Obama's visit in Jerusalem in March 2013, Netanyahu agreed to public apologies for the Israel strike on the Gaza flotilla and compensation of the victim's families. An Israeli-Turkish pipeline would be 600km long and cost around \$2billion. This would be the most cost effective option. Gas would be sold to both the EU and Turkey. The pipe could be ready by 2016 when Leviathan starts producing. However the pipe will most probably have to pass through Cyprus EEZ (and eventually Syria), and thus rely on the improvement of Turkish-Cyprus relations.<sup>27</sup>

The export of gas overland to Europe and regional neighbours up north would be the most cost effective route. This however appears a difficult option given the country geopolitical situation. Liquefied natural gas export's infrastructure -though less cost efficient- is more appealing to Israel, and most of the Levant countries. Additionally, this would allow east Mediterranean countries to sell their gas on Asian markets, where prices are high. According to WoodMcKenzie, the netback from LNG given the price differential in Asia could be as high as \$7/Mbtu. This option is yet not either immune to regional tensions, and requires heavier investments.

In terms of LNG, Israel disposes of several options: building a terminal on the red sea to target Asian markets, using its neighbour's facilities either in Egypt or in Cyprus, or have a stand-alone or shared floating LNG platform (a very expensive technology today).

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26 In 2009, Israel's airforce raid on the Mavi Marmara, a flotilla which tried to break the blocus on Gaza, killed nine activists and successively lead to the breach of Israel and Turkey diplomatic relations.

27 . It could be repaid within two to three years assuming gross sales of 10 bcm a year for 7-8 years on a take or pay basis. (Source: <http://www.globes.co.il/serveen/globes/docview.asp?did=1000822391&fid=1725>)

Map 5: Turkey-Israel Planned Energy Corridor



source: le blog finance

There might however not be enough gas so far to allow for the proliferation of LNG liquefaction plants in the East Mediterranean. Regarding LNG's liquefaction plants, economies of scale matter.<sup>28</sup> Given the volumes of gas discovered so far, and uncertainty over the share allowed to be exported, LNG investments prove hard to make. Even more so as the amount of liquids contained in the offshore gas fields, and which would enhance such projects' economic viability, is uncertain. There are additionally environmental restrictions and onshore LNG facilities have an environmental impact. Tamar developer for instance faced delays building an onshore processing facility in the north and finally had to opt for the South. Finally, these high capital cost projects can be developed by IOCs, such as Shell or Petronas for floating LNG facilities, but these companies have a high exposure in Arab rich country, and sometimes Turkey. This could

<sup>28</sup> A single LNG train (greenfield) cost around \$4.5-6/Mbtu compared to \$3-5/Mbtu for a brownfield. Oxford Energy Institute, East Mediterranean Gas: What kind of a game changer? December 2012, Available at <http://www.oxfordenergy.org/2012/12/east-mediterranean-gas-what-kind-of-a-game-changer/>

make them hesitant to invest in Israel.<sup>29</sup> They could therefore hesitate to invest in Israel. There are also doubts on whether two additional LNG trains would be useful in the region. Egypt is so far underutilizing its own.

This explains why the development of a joint facility with Cyprus has so far been very appealing to Israel. Israel is so far much less advanced than Cyprus in the development of gas liquefaction infrastructure, which plans a 3-trains LNG facility of 5 million tons per year to be operational by 2019. The project of joint facility with Cyprus is very tempting for Noble Energy who bought the rights on the Cyprus Aphrodite block 12 field.

So far two options have been developed. On the one hand, the Tamar field gas will probably be exploited through a floating LNG facility. A memorandum of understanding was finally signed with Daewoo in 2011-2012 for the building of a 3 mpta LNG facility (around 4.5bcm/year) for \$3 billion. This will be the third operational floating facility worldwide. Gazprom, through its filial Gazprom Marketing and Trading, was conceded the exclusive rights to export LNG from Tamar for twenty years (i.e. about one third of Tamar production will be exported by 2017 on). The SPA (Sell and Purchase) agreement on the Dalit and Tamar fields was signed, and the final investment decision should be made by the end of 2013. This will be the first-ever SPA from a FLNG project to a third-party independent buyer without involvement of a major IOC. The company hoped it would also be conceded rights on Leviathan gas export, but these were finally sold to Woodside.

On the other hand, Leviathan gas could be exported via a joint facility with Cyprus. In March 2012, Cyprus, Greece and Israel signed a vague Memorandum of Understanding on joint cooperation matters. The MoU failed to establish a third route for future gas supply to south east and central Europe. Furthermore no roadmap with predefined export option was drafted. Greece and Cyprus relation with their Arab neighbours would probably have been weakened. Yet, in November 2<sup>nd</sup> 2012, Israel signed a bilateral energy development agreement with Cyprus, and Noble Energy announced development of a major LNG facility of the Island nation's south coast (a \$10 billion dollar LNG project to be built at Vasiliko near the University of Cyprus and connecting with Israel Leviathan field). Woodside won the bid to buy 30% of Leviathan share against its participation in the capital cost, technology know how and exportation of LNG from the field.

Cyprus's financial woes and the beginning of a rapprochement between Jerusalem and Ankara, that reopens opportunities of gas export via pipe to Europe, may switch export options.

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<sup>29</sup> Shell could sell its 23.1% share in Woodside. The dutch firm is present in the EAU, Turkey etc.

Investment decisions still depend on the approval of the Tzemach Committee recommendations. The development of joined facilities outside Israel territory has faced some opposition so far. It will have to be linked to Israel by pipe, which is adding further to its cost. The normalization of relations with Turkey would open another interesting option for the development of Leviathan.

### **Israel politics divergence on energy security**

The gas found can therefore be used to improve the country trade balance and help it secure its energy supply. This gas could fuel the country's power plants, refineries and possibly the transport sector. On the other hand the government can benefit from gas exports as a strategic asset both in terms of revenues and geopolitical positioning. The issue of what will this gas be used for, i.e. gas commercialization, is also crucial for upstream companies' decision to invest into fields development and further exploration in Israel's deep waters. As the domestic market is rather small, the possibility to export is a major concern.

The concern over energy security might be the main uncertainty factor in the prompt and successful development of Israeli gas resources. The lack of consensus on this issue has led to a fierce national debate. On the one hand strong defenders of the country security were opposed to a large share of gas being committed for export. On the other hand, some were concern about creating a favourable climate for upstream investments and securing revenues for the government. Voices (mainly carried on by the Finance Ministry and the Prime Minister himself) were also concerned over the cost of delaying further the production from Tamar and Leviathan by not taking any business friendly and timely decision.<sup>30</sup>

To proceed with a decision, the Israeli prime minister appointed an inter-ministerial committee in 2010, named after its chairman Shaul Tzemach (the at-the-time minister of Energy and Water Resources director-general). The committee had to give recommendations regarding the strategy the government should adopt on natural gas, and in particular as regard the controversial export of Israeli gas. In particular the committee had to decide on the share available for exports on the basis of the country's future gas economy. It agreed on four main principles on which to base their conclusions: first to ensure the long term supply of the domestic market, second to boost gas market competition, third to ensure low gas prices for consumers and last to increase government revenues.

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<sup>30</sup> The Tzemach committee stated that postponing the development of the Leviathan reserve by one year will lead to direct loss of state revenues of \$400-700 million, depending on various scenarios.



Several issues proved to be highly contentious such as the share of gas that should be allowed for export. Although it was first commonly decided that Israeli domestic gas needs would have to be covered until at least 2040, Israelis were strongly divided on the evaluation of domestic needs.

Initially in favour of relatively low gas exports, the committee ultimately revised its interim report published in April 2012. After a public hearing, the committee revised the export share upwards and softened export rules. The final report, released in August 2012, recommends that 500 bcm (around half the current discoveries of 950bcm) can be exported as long as there is sufficient gas to cover the country domestic needs for 25 years. The country needs were estimated at about 450bcm through 2040.<sup>31</sup>

On the other hand, gas partnerships exploiting large reserves (over 200 bcm, such as Tamar and Leviathan) should be allowed to export more than 50%, on the condition that another discovery is made to cover Israel domestic needs. The report encouraged further the development of smaller fields, allowing medium size reserves (100-200 bcm) to export 60% and small reserves (under 100bcm) to export 75% of their production. Some more flexibility has also been introduced as compared to the interim report. Gas reserves for the purpose of calculating allowed exports, will now include both proven and unproven reserves, so as to encourage the development of the fields. Both reserves and demand estimates will have to be reviewed every five years to make sure the country needs are effectively secured in case the country domestic consumption grows faster than expected, and to allow for larger volumes of exports in the case of further discoveries.

The issue of demand forecast and reserves evaluation proved highly controversial. A few months before the report publication, the Natural Gas Authority revised its domestic gas demand forecast 20% up.<sup>32</sup> The Tzemach committee forecasted among others a major and imminent switch to gas for the power sector (about 75% of the power fuel mix will be gas by 2020). But its estimates diverge from the Natural Gas Authority as regard the use of gas for transport and the speed at which oil can be displaced. This is a strategic issue, as some consider the displacement of (Arab) oil in the transport sector by CNG (or methanol made out of natural gas, or even mixed fuels) as a priority. Gas is likely to penetrate first through the power sector where it will benefit from existing gas fired power plants projects. Gas consumption across sectors will grow rather slowly at first, accounting for the development of infrastructures and the industry absorption capacity. The gas consumption curve could then be exponential until

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<sup>31</sup>Tzemach Committee's final report available at :  
<http://energy.gov.il/English/Subjects/Natural%20Gas/Documents/pa3161ed-B-REV%20main%20recommendations%20Tzemach%20report.pdf>

<sup>32</sup> The Natural Gas Authority revised its domestic gas demand from 420 billion cubic meters (BCM) up to 501 BCM through 2040.

all sectors of the economy are saturated. The use of gas in other sectors than electricity will also likely depend on the government's policy to facilitate such a move. This explains further why this issue can be controversial. On the supply side, bad results from the exploratory drilling at the Mira and Sara sites south of Tamar, which were 90% below forecasts, raised doubts over the committee's projection of Israel gas supply. Conservative voices were therefore advocating for a gas reserve covering 50 years of consumption.

Another contentious issue was the state control over gas infrastructure. The interim report requested that export infrastructures had to be on Israel territory, in particular for protection purposes. This stood against plans to build shared LNG structure with Cyprus, one of the options favored by Noble Energy which is developing both Tamar and Leviathan on the Israeli side and Aphrodite (Block 12) on Cyprus' side. The final report softens this requirement, though every export structure is encouraged to be on Israeli territory and should be linked to Israel by pipe.

Past politics have given a bad taste to investors and this explains why the committee revised its initial position.<sup>33</sup> Some recommendations though may increase the cost

The Tzemach report recommendations are still waiting for governmental approval and a clear energy law has still to be set up by the newly elected government and the Knesset. The process seems in good way, and apparently in the interest of companies, as shown by the buying of 30% rights on Leviathan by Woodside, an Australian company expert on LNG exports. Would the debate on energy security lean towards the more conservative position, this could have a major impact on Israel export solutions.

## ***Cyprus: a crisis exit's strategy?***

The discoveries offshore Cyprus appears as a golden opportunity at a time of severe financial and economic crisis. The serious difficulties of Cyprus economy hit the headlines of the world newspapers in the last months.

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<sup>33</sup> The retroactive setting up of taxes after Noble Energy just invested \$1 billion in Tamar was seen as a hold up. Additionally the Israeli Antitrust Authority is now evaluating whether or not the energy consortium of Tamar and Leviathan, which include the same companies although with different shares – namely Noble Energy, Delek Drilling and Avner Oil, should be restructured to ensure more competition (Source: Pétrole et Gas Arabe, 16 Avril 2013)

## Decreasing Cyprus expenses and creating a new economic sector

The most obvious use of the gas produced would be therefore to reduce the country energy bill. Currently most of its power plants still run on crude oil and liquids (96%). In 2010, power plants' fuel cost the country 1.3 billion, i.e. 7% of its GDP. Net electricity consumption is growing fast (around 5.5%).

The Electricity Authority of Cyprus (EAC) had actually already launched a plan to switch the power sector to gas thanks to LNG imports. But following the discoveries, the 20-years LNG import contract with Shell was dropped mid-2011.<sup>34</sup> The country domestic gas was already evaluated at the time of the gas discoveries and this gave companies more visibility to invest and Cyprus a head start in the planning of export infrastructures. Current steam turbines could be easily switched to gas by 2015. The government estimates the need of the power sector at 2.5 bcm, 3 bcm by 2025 with a full substitution (1.7 bcm for stationary and power, and 1.2 bcm for transports).<sup>35</sup>

Gas reserves can also provide for jobs, mainly through the exploration, production and transport activities. This is a vital objective as the service sector in particular (banks, tourism, real estate), making about four fifth of the country's GDP, is collapsing.. As in the case of Israel, the development of refining activities would face the strong competition of MENA countries which dispose of cheap feedstock and limiting environmental EU regulations.

## Cyprus export options

Cyprus considers five possible projects: a joint underwater pipeline from Israel's gas field to Cyprus, a gas liquefaction plant, a methanol plant, a 1,000-megawatt power station and a strategic reserve, all on the island.

An 8bcm pipeline to Greece to supply the EU is another possibility being considered. The pipe would link Crete subsea (about 700 km), cover 200 km onshore for the gasification of the island, and then 200 km subsea, for a total of 1100km. Athens showed an interest in the project, and so did the public gas corporation DEPA. Such a project would benefit relatively high market prices and regional synergies (many pipes are currently being built TAP, ITGI

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<sup>34</sup> According to Solon Kassinis, the gas price was indexed at 0.98 the price of oil (almost the same price) and estimated at \$10.5/Mbtu while domestic production should amount to \$4.5/Mbtu source: <http://www.cyprus-mail.com/energy/great-communicator-comes-clean-gas/20110213>

<sup>35</sup> Please refer to :

[http://www.mcit.gov.cy/mcit/mcit.nsf/dmlgas\\_en/dmlgas\\_en?OpenDocument](http://www.mcit.gov.cy/mcit/mcit.nsf/dmlgas_en/dmlgas_en?OpenDocument)

and IGB which connects to Bulgaria). The gas pipeline tariffs are likely to be less expensive than LNG for Greece (about 1/3 of the cost) and Italy (2/3 of the cost) according to the Oxford Energy Institute. However, the pipelines which will be 1000km long with segments at 3000m water depth represent a technical challenge (it will be twice the size of south stream in deep waters – estimated at \$25-30 billion). Although it is feasible, it will not necessarily offer the best returns on investment.

A fifth corridor could increase Europe energy security, even more so as import from Azerbaijan will through the southern corridor be reduced from an initial estimate of 30 bcm to 10 bcm. This export option will however be confronted to the decreased budget of the European Union's infrastructure package, dedicated to the financing of strategic infrastructure projects, and the Greek economic crisis which damages the country's ability to finance large infrastructure projects. The economic viability of such a project still needs to be proven as it will partly depend on other gas pipelines achievements, the upgrading of the Greek gas system and regional interconnectors. The electricity interconnection between Greece and Crete planned for a long time is for instance still stagnating and will probably not be achieved any time soon given the financial crisis.

Cyprus could also link to Turkey via a 200km pipeline. Such a project would benefit of sustained Turkish gas demand compared to European one, but will likely face specific political bottlenecks.

The preliminary work is an asset for Cyprus gas fields' development and the country LNG plan is the most advanced in the region. LNG liquefaction has been so far regarded as the most viable option. Plans to build an LNG liquefaction facility are in an advanced stage, and the government agreed to the development of a 5 mmpta liquefaction plan at Vassilikos proposed by Noble Energy in June 2012.<sup>36</sup> However the amount of gas found in Aphrodite do not economically justify on its own the building of a liquefaction plant. If no liquids are found, Cyprus would have to wait for more blocks to start production or to consider joint projects with Israel. The Vassilikos LNG facility could link up to Israel. The option to market LNG to Europe is materializing with the award of licenses to Total and ENI.

### **Monetizing the financial crisis?**

Cyprus, which is facing a severe financial economic crisis, needs €17 billion to stay in the Eurozone versus a €23 billion GDP. The country

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<sup>36</sup> So far project is for one LNG train of 5 mpta, capital cost \$6/7 billion. But the Cypriot NOC will have to be the main shareholder in any future LNG facility, under the country legal framework. This rules out the possibility of integrated ownership structure for LNG projects.

gas reserves are now seen as a way for the country to avoid austerity measures requested by the EU and the IMF.

Russia is also interested in the country's reserve. The country which was initially in favour of the bail-out finally withdrew its support at the end of March. It hoped it could secure priority access to Cyprus gas fields, after its failure to secure an exploration and production bid with Total and Novatek, in exchange of an additional €2.5 billion loan.<sup>37</sup>

The timing at which the country can benefit from export revenues is however still uncertain. Charles Ellinas, the head of Cyprus Hydrocarbon Company, estimated that the country could export gas (around 56 bcm) to the EU by 2019. More drilling is however firstly required, and export will likely depend on the development path of other blocks. So far discussions are ongoing with Israel, and could receive Israeli gas starting from 2015.

There moreover are still institutional issues to be solved. Many actors interplay: The Public Gaz Corporation DEFA which has the monopole over gas imports and marketing in Cyprus, the electricity company which has rights over 44% on the liquefaction plant, and the Cyprus Energy Regulatory Authority which will have a role as regard exports, the technical committee set up in 2012 which evaluates offers and negotiate them but can be also bypassed by the council of ministers if the issue considered relates to national security or public interest. The country is also trying to set up a national upstream sector, for which a model should be defined.

## ***Lebanon: catching up?***

Lebanese offshore gas reserves might be higher than expected and contain oil. The exploitation of these resources could help relieve the large debt of the country (150% of GDP), and revenues from the discovered fields could cover up to ten times the national debt according to the Energy and Water minister Gebran Bassil. The gas could also be used to displace some of the country on oil and gas imports which currently amount to 15% of its GDP.

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<sup>37</sup> Russia fiercely opposed the proposed tax on bank deposit which is part of the bail out. Cyprus banks hold approximately \$20 billion, which could include around \$2 billions from Russian citizens. A large number of Russian holdings are also registered in Cyprus, but dividends won't be hurt by the measures of taxing revenues up to 10-12.5%. Putin finally opposed the measure, despite the declarations of Sergueï Chatalov, the finance minister deputy (Le Figaro, 18<sup>th</sup> of March 2013). Gazprom bank subsequently proposed a financial support to Cyprus (Les Echos, 19<sup>th</sup> of March 2013).

Gas will be primarily used to fuel the country power sector, but there is uncertainty on how much will be needed. The country average electricity consumption is growing at a fast rate of 5% per year, but these figures are non-accurate as there is a lot of self-generation in the country, and a lack of consumption data gathering. Underinvestment in the sector has been massive forcing Lebanon to import electricity from Syria. The country aims to raise the share of gas in its power mix to two-third, but so far struggled to fuel its CCGT plants with gas. It signed gas import deals with Syria in 2003 (1.5 bcm/year for 25 years) through the Arab Gas Mashrek pipeline. But Syria was not able to provide this gas, nor was Egypt despite a 2009 deal. A lot of gas will consequently be needed to fuel current and future power demand. Given the lack of infrastructures, the use of gas in other sectors is likely to take more time.

This will however depend on the country ability to set up the right institutional and legal framework. This proved slow so far and the gas, with no further delays in the process, should not be expected before ten years. Norway helped the framing of a law in 2006. The law was however only approved in 2010 and its content has been subject to changes, integrating the complex Lebanese political game. Even though Norway advised the setting of an independent regulatory body to evaluate the exploration and production bids, this was finally replaced by an advisory body and an authority in charge of the bids. The Authority in charge of the regulation, the so called *Commission*, was finally approved in November 2012, finally opening up the way for international energy companies in Lebanese offshore zones. The Commission will be in charge of negotiating exploration and production contracts, and the good implementation of contracts and clauses. Its six members were mainly chosen for a six year period, with a one year rotating presidency on communitarian considerations.

The first tender was announced by the end of 2012, and the commission is in the process of evaluating up to 52 propositions but so far little has been decided. In particular two main decrees are still awaited: one regarding the number of blocks for auction, and one establishing the framework for exploration and Purchase and Selling Agreements. Royalties and taxes on companies, as well as revenue sharing are indeed still not defined, although it has been decided that there will be no sharing of production (only royalties which will go to a sovereign fund and taxes to the Treasury). No agreement has been reached on the establishment of a sovereign fund.

The government's resignation is blocking the approval of these decrees. Ministries can launch the tender process without the government approval but only the Cabinet can allow licenses. For instance, 10 licenses for 10 separate blocks offshore have been

presented by the Petroleum Authority but the government resigned before they were approved.<sup>38</sup> This will have to wait for the designation of a new cabinet by the newly designated Prime Minister, Tammam Salam.

Lebanon is not expected to produce gas before 2020, this time frame will change, would any delay in the building of a legal framework occur. The country ability to develop its resources will also depend on geopolitical developments. In August the Lebanese parliament voted the delimitation of its EEZ, but Israel has drafted a different one and the UN does not want to state on the issue. Any conflict is unlikely on both sides however given the amount of the investments requested to develop oil and gas energy resources. More serious are the potential spill-over of the Syrian conflict and the country political instability. Signs of resources nationalism by the Hezbollah and its allies, the largest group in the Assembly, will be watched closely.

The recent call for tenders showed the interest of major IOCs and independent oil and gas producers, in an unprecedented way for a first bidding round in the region. Lebanese ability to develop its oil and gas resources now strongly depends on the setting of adequate energy governance. The country will need to identify its domestic needs, set up a tax policy, and exploration and production framework.

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<sup>38</sup> Daily Star Lebanon, April 2013

## New Offshore Gas Resources, Emerging Wars?

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The ability of Levant's countries to develop gas reserves and export gas in the most cost efficient way also depend on the regional geopolitics. Reserves are now becoming a new source of tension. Every country wants its slice of the cake but offshore borders were not previously defined. This is impacting security costs of offshore gas platforms.

### *The laws of the sea*

Maritime borders are usually fixed within the rules of the United Nation convention on the Law of the Sea (UNCLOS), which came into force in 1994. Every country benefits of a maritime territory which expands up to 19km off its coast. Beyond, the convention establishes the exclusive economic zone (EEZ) 370 km off from the coast (article 55-70). Although given countries like for instance Turkey or Israel have not ratified the convention, it still applies as international law.

The definition of maritime border is not however always easy. States may indeed draw their EEZ by decree or national legislation but in some cases, and in particular in close seas like the Mediterranean, these EEZs overlap. When they do, states may define their border through a bilateral agreement on the mentioned principle of "equidistance", defined as the "line at every point of which is equidistance from the nearest points of the baselines from which the breadth of the territorial sea of each of the two states is measured". This equidistance principle can be corrected to account for special circumstances or historic rights, and this is where the problems lie. As this obviously leads to a variety of interpretation, two other principles have been decided upon: "fairness" and "proportionality". They might be used for instance in the case of unequal territories: a small island and a long coastline, or in the case of particular configurations of the



coast.<sup>39</sup> However as each case is unique, these principles actually prove difficult to help define a criteria and leads to a large variety of cases. The Mediterranean appears unfortunately gifted in terms of special circumstances, islands and indented adjacent coast lines.

To ensure the freedom of navigation and access to fishery resources and also to avoid borders' disputes, very few coastal states in the Mediterranean had so far claimed for Exclusive Economic Zones. But the recent gas discoveries have changed mind-sets. Eastern Mediterranean countries have urged the delimitation of their maritime borders, to start exploring or to ensure their country the largest reserves possible.

### ***Border delimitations in Eastern Mediterranean***

All the regional border tensions have successively been revived as offshore gas exploration advanced: the Israeli-Lebanese border disputes which led to war in 2006, the Israeli-Palestinian tensions and last but not least tensions over Northern Cyprus. So far none of the Levant countries has managed to achieve its offshore borders delimitation.

Cyprus is the most advanced country in that respect. It has already signed an agreement with Egypt, Israel and Lebanon. In 2003 it signed an agreement with Egypt, and consolidated it in May 2006 by an agreement on confidentiality over the development of joint fields which was passed in 2012 by the Cyprus parliament. An agreement was also signed with Israel in 2010, and Cyprus hopes to soon sign an agreement on the development of joint fields. The two countries already ratified a strategic defence partnership including the exchange of classified information, and a search and rescue agreement. Cyprus is facing more difficulties for the ratification of a border agreement with Syria and Lebanon, given the opposition of Turkey. However in 2007, Cyprus and Lebanon signed a border agreement but the latter now wishes to review the first point of demarcation, which compromise its exploitation of fields at the Israeli border. Cyprus offshore exploration has strongly revived tensions with Turkey. Back in 2007, Turkey was negotiating its EU accession and this benefited Cyprus. As this window of opportunity is reduced, Turkey has radically opposed Cyprus offshore gas exploration and disputes the country the right to develop its EEZ claiming it overlaps northern Cyprus own EEZ.

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<sup>39</sup> For instance, France rejected the delimitation of maritime borders on the principle of equidistance in the Gulf of Lion, as the Spanish coast was convex versus the French concave coast.

Turkey sensitivity as regard its maritime borders is not new. The country, like the state of Israel, never signed the UN convention. The numerous and small Greek island offshore its coast would indeed reduce its EEZ significantly. The country already threatened Greece of war, which signed the convention about three decades ago, would it define its EEZ.

Offshore gas discoveries also revived strong tensions between Lebanon and Israel, already conflicting over the possession of the Sheba farms.<sup>40</sup> Reacting to Israel gas exploration and production activities offshore, the Lebanese parliament strongly opposed Israel offshore gas activities, and the Hezbollah threatens to intervene in June 2010. Lebanon finally called in the UN to settle the dispute, proposing its maritime borders in August 2010, and the delimitation of the country maritime border with Cyprus in August 2011. Originally, Israel maritime border agreement with Cyprus started from the original point 1 of Cyprus/Lebanese maritime border agreement, which the latter is now asking to reconsider. The UN refused to decide as it maritime border delimitation not part of the UNIFIL mandate, while the US state department, to which the proposal was also submitted, endorsed the proposal.<sup>41</sup>

Israel, which is several steps ahead of Lebanon in its offshore gas development activities, strongly rejects the Lebanese maritime border delimitation. Although Lebanese claims do not harm seriously Israel exploration licenses as the area they cover is not yet on Noble Energy agenda, the line drawn by Lebanon actually overlaps Israel claimed maritime territory by 850 km<sup>2</sup> and involves the northern extreme of the Along and Ruth licenses, small structures which might contain gas or oil. This line also draws the Tamar field closer to Lebanese borders (around 35km). Although the Lebanese energy minister initially denied Tamar could straddle at Lebanese water, the Lebanese media, followed by some politicians, are now getting tougher. Israel has also been holding for years the development of the Marine gas field, discovered in 2000 offshore Gaza. British Gas indeed attempted to settle a gas industry in Gaza, invested up to \$50 million and drilled Gaza Marine 1 and Gaza Marine 2. There are undergoing negotiation for the exploitation of the Mari B site and the

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<sup>40</sup> When the UN withdrew from southern Lebanon in 2000, the UN traced out the Israel Lebanon land border but left out the maritime border.

<sup>41</sup> UNCLOS rules for such a situation suggest that Cyprus's maritime borders with Israel and Lebanon should intersect at a point equidistant from the three countries, which would be around eleven miles south of Point 1. The result is that a triangular piece of sea spanning over 300 square miles is in contention. (For more details, please refer to: <http://www.washingtoninstitute.org/policy-analysis/view/cyprus-helping-with-israel-lebanon-maritime-dispute> and <http://www.naturalgaseurope.com/cyprus-offers-mediation-between-lebanon-israel>)

Noa field which may be located at least partially into Palestinian borders, while Noa and Marine 3 could end up coming from the same field.

All these countries would however loose from a conflict, which would substantially level off extraction and infrastructure costs, and would benefit from resource sharing agreements. Turkey seems in particular to miss the opportunity of maintaining its strategy of becoming a gas hub to Europe.

Such maritime border issues can be dealt via international law mechanisms even though the countries are not signatories of UNCLOS. Many possibilities exist such as the International Tribunal for the Law of the Sea, the International Court of Justice, or arbitrated by a panel of experts agreed upon by the conflicting parties.<sup>42</sup> The UNCLOS requires an interim agreement between the two parties, and so far submissions made have only been unilateral. The international Tribunal for the Law of the Sea cannot be referred to until countries that are not signatories of the UNCLOS (like Israel and Turkey) expressly agree to its jurisdiction.<sup>43</sup> Third parties could act as mediator too.

Both the US and now Cyprus are trying to prevent escalation. The US is keen to prevent another conflict from arising, the targeting of Israeli installations by Hezbollah, known for its possession of anti-ship missiles, which would also harm the interest of Noble Energy, an Israel-US led consortium. Similarly, Cyprus willing to develop joint facilities with Israel and start its offshore activities rapidly has finally offered its mediation. In particular, the country is looking at a joint LNG facility project with Israel, obviously wishes to avoid being trapped in a bilateral conflict.<sup>44</sup>

All countries would need to first agree on the border demarcation process. Lebanon – Israel maritime border issue will be hard to settle as long as Israel calls on to begin negotiations on all border issues, not just maritime boundary.

So far however, the lack of border delimitation has not prevented the development of gas fields nor delayed licensing rounds across the Levantine countries. This would be harder however, would any important fields be discovered in a disputed area.

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42The International Court of Justice only has jurisdiction on the basis of consent, parties would first have to agree to the court's jurisdiction

43<http://www.asil.org/pdfs/insights/insight111205.pdf>

44The Lebanese proposal to the UN was endorsed by the US, after the US diplomat Frederic Hof, who was responsible for Syria and Lebanon under the former US Special Envoy to the Middle East, George Mitchell, submitted the plan to a panel of outside experts. A meeting in May 2012 reveals that Lebanon was willing to propose a blue demarcation line between the two countries maritime territories, leaving the disputed areas for subsequent negotiations with the UN framework by the two parties. This would block exploration and production in the area.

## Will Turkey Be Stolen The Show?

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Over the last years, Turkey energy policy has evolved on two axes: consolidating itself as a regional energy hub and securing energy for its growing domestic needs.

The country needs to respond to growing domestic energy needs. Although its energy consumption per capita is still relatively low, the country has seen the fastest energy consumption growth in the last years. The International Energy Agency expects energy consumption in Turkey to double by 2025.<sup>45</sup> Turkey is currently consuming 50 bcm of gas per year (mainly to fire gas power plants), and consumption grows as fast as 6/7% per year. This high domestic consumption growth is eroding Turkish ability to maintain its role as transit country, as excess pipeline capacity is now used to meet the growing domestic demand. The country has therefore stepped up shale gas in the south east, oil exploration efforts in the black sea and started to gather 2D and 3D data on the Mediterranean.

Already a transit country for seaborne-traded oil from the Caspian and Russia, it has reinforced its strategic positioning as an energy transit country to Europe through the southern gas corridors. In this perspective, Turkey has supported the initial project of a Euro-Mediterranean pipeline and more recently favoured oil and gas development in the Iraqi region of Kurdistan despite the opposition of the Iraqi central government.

The gas discoveries in East Mediterranean could be viewed by Turkey as an opportunity to feed its growing domestic gas demand on the one hand, and to secure its role as transit country towards Europe. But so far the potential benefits Turkey could draw from these new discoveries as a transit countries have been polluted by its bad relation with Israel, the only result has been exacerbated tensions over the unresolved issue of northern Cyprus.

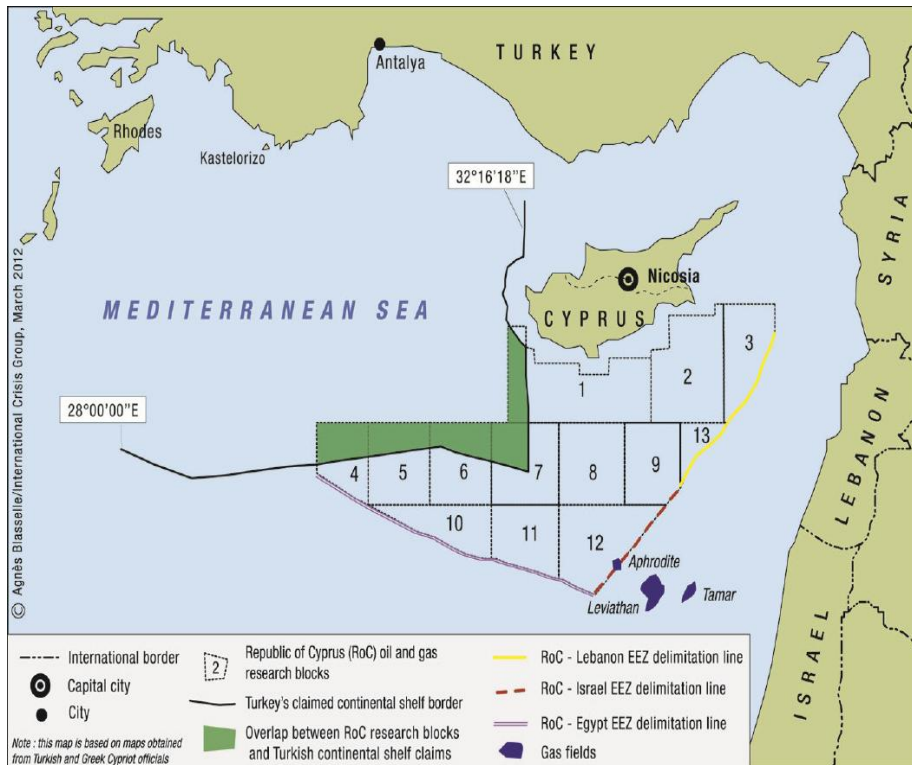
The country is contesting Republic of Cyprus' activities offshore on the basis of Northern Cyprus border claims even more so as it is being quite late in prospecting for its own potential resources. Turkey disputes the border agreements that Cyprus signed with Israel and Egypt, and states that UNCLOS provisions cannot apply to Cyprus as it is an island. This policy of border claim is not new. Turkey has always threatened Greece -a signatory of the UNCLOS

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<sup>45</sup> Electricity demand is expected to grow at an even faster rate

convention- of war would it claim its Exclusive Economic Zone in the Mediterranean. Greece so far refrained to develop its offshore gas resources, believed to hold major oil deposits as well as natural gas. This changed as Greece submitted its EEZ claim to the UN in February 2013, immediately after Ankara submitted its conflicting version. The country is pursuing so far a policy of border claims but it remains unclear how far it wants to go.

**Map 6: Turkey contest of Cyprus offshore blocks**



Source: International Crisis Group, March 2012

Turkey policy is however proving quite unsuccessful. It failed to impact costs of producing gas offshore, and did not prevent IOCs to bid for offshore blocks in Cyprus EEZ. The Cypriot second call for tenders indeed encountered a lot of success on the blocks 3, 8 and 9. Blocks 4 and 5, contested by Turkey, did not receive any bid, yet their potential is believed to be limited. On the contrary, Turkey's strategy left the country quite isolated internationally, weakening its strategic positioning in the region. The US, the EU and Russia all appear to support –though for different reasons- the undergoing exploration and production in Cyprus and the country strengthening partnership with Israel. Catherine Ashton, the High Representative of the European *Union* for Foreign Affairs & Security Policy, warned Turkey of any military action in September 2011. In November 2011, Russia announced it was sending its aircraft carrier (the Admiral Kuznetsov) for manoeuvre off the disputed areas. In response to Turkish threats,



Cyprus also started building a strategic partnership with Israel. Israel foreign deputy minister, Dany Ayalon, declared in November 2011 that Israel would be ready to defend Cyprus offshore gas activities. This was confirmed by Nentanyahu during his February 2012 visit in Nicosia.

Recent warming in its relation with Israel could be a sign that the country now seeks a foreign policy more in line with its energy interests.

## Conclusion

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Discoveries of offshore gas reserves offer a radical energy shift for east Mediterranean countries. These should help them boost their economies and ensure their energy security in an unstable region. Common energy interests and cooperation potential emerge among neighbouring countries like Israel and Turkey, or Israel and Cyprus but relations are still very tense on border issues. Syria is also a real concern for the emergence of regional partnerships.

Each of the Mediterranean state faces a particular challenge. In Israel, the setup of an adequate energy policy is subject to intense political debate on the issue of national security. Development of the country's unconventional oil resources would achieve the country's energy revolution. Cyprus is on the other hand very concerned about rapidly securing revenues to offset the financial crisis. The amount of reserves is so far insufficient for the country to develop fields and export gas without the cooperation of Israel. As regard Lebanon, the main issue will finally be the country's ability to set up the right governance framework.

All countries are targeting revenues from export. The volumes of gas available for exports are even more pivotal to attract investments as their domestic markets are currently quite small. They are competing to have the lead in exports. Indeed once gas will be made available for exports, then everyone will get obsessed with just one question: what will be its destination?

The obvious options after immediate, needy and friendly neighbours, not such an evident criteria in the Middle East, should be nearby Europe. After all Europe has long looked at possibilities to diversify its gas imports from Russia by looking at the region, and some of this gas is located in Cyprus, and EU's Member State. But does Europe need that gas, and does it want it liquid or piped? The question of export undoubtedly links to the role of Turkey, which has consolidated itself as an energy transit country to Europe for years.

Export options will in the end probably be framed by the world complex gas markets and regional politics rather than geographical evidence. The current energy landscape, in complete revolution, may not provide a clear cut answer. While European demand is declining, the evolution of the LNG market, and LNG prices in particular is uncertain. The US shale gas revolution has revived the hopes of many countries worldwide to find and explore their own gas, gas finds



have been multiplied thanks to high oil prices and so have LNG facilities project, although more recently geant ones have seen a backlash. Other factors will be play a large role on gas demand worldwide: countries policies as regard their energy mix, countries transport policies, coal prices. This might be further impacted by the development of tight oil in the US.