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Summary: Since its establishment in 1948, Israel has been heavily dependent on foreign supplies of energy, but this is soon to change. The offshore Tamar natural gas field, coming on-stream in 2013, will satisfy current domestic demand for gas as well as projected expanded use. The offshore Leviathan field has the potential to make Israel a significant energy exporter after production begins in 2017. A major dilemma facing Israeli decision-makers is the choice of how to export surplus gas. Although this will not happen until at least 2017, decisions have to be made much sooner. The possibilities come down to exporting it after converting it into LNG, sending via pipeline, or using it to generate electricity, which is then exported by undersea cable. All options have political challenges, as described here.

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Energy Discoveries in the Eastern Mediterranean: Source for Cooperation or Fuel for Tension? The Case of Israel

by Simon Henderson

Energy Overview

Since its establishment in 1948, Israel has been heavily dependent on foreign supplies of energy, but this is soon to change. The offshore Tamar natural gas field, coming on-stream in 2013, will satisfy current domestic demand for gas as well as projected expanded use. The offshore Leviathan field has the potential to make Israel a significant energy exporter after production begins in 2017.

Yet, until mid-2013, Israel faces a supply gap. Indigenous production of natural gas is dropping because of depleted reservoirs, a deficit worsened by reduced quantities supplied under a 2008 contract with Egypt. (Egypt cancelled the deal in April 2012.) In the meantime, power plants are being forced to switch to expensive and environmentally dirty fuel oil. Temporary arrangements are also being made to import liquefied natural gas (LNG) from abroad, a cheaper solution than using fuel oil but still more costly than budgeted for. There remains a risk of blackouts during the 2012 summer peak demand season.

A major dilemma facing Israeli decision-makers is the choice of how to export surplus gas. Although this will not happen until at least 2017, decisions have to be made much sooner. The possibilities come down to exporting it after converting it into LNG, sending via pipeline, or using it to generate electricity, which is then exported by undersea cable. All options have political challenges. An economic challenge is that the market for natural gas is changing, and long-term fixed price contracts, which once were able to guarantee the revenue to finance the initial high capital costs, are now much rarer. Natural gas supplies are increasing because of new discoveries and the advent of shale gas. Although natural gas is now a very popular fuel, prices are low, making commercial decisions for suppliers difficult. It is also difficult to forecast whether the differential between the current low prices in Europe, the closest major market to Israel, and the higher prices (as much as four times) in the more distant Asian market, will be maintained.

Background

Although often said to have no oil reserves, Israel has in fact been a very minor oil producer for many years. Since 1960, the small onshore Heletz

field, near Kiryat Gat, has produced a few hundred barrels per day, which is trucked to the refineries in Ashdod and Haifa for processing. But Israel's present demand for oil is around 250,000 barrels per day, so the very large balance must be imported. Currently, Azerbaijan and other parts of the former Soviet Union are major suppliers of crude oil to Israel. Azeri supplies come via the Baku-Tbilisi-Ceyhan (BTC) pipeline to Turkey, and then by tanker. Other supplies come via Black Sea ports. There is the prospect of "deep oil" being discovered in the Leviathan field, Israel's largest natural gas reservoir. But, in the last 60 years, although about 480 wells have been drilled mainly onshore, there has been a notable lack of commercial success.

Natural gas was discovered in the Mediterranean Sea, offshore Israel, in 1999. Supplies have flowed from the first field to be exploited, the Mari-B, since 2004. This field is almost depleted but far greater reserves have been discovered, notably the Tamar field in 2009, estimated at 9 trillion cubic feet (tcf), and the Leviathan field in 2010, for which the latest estimate of reserves is 17 tcf. Production from these fields has yet to start. The Tamar field is scheduled to come online in the second quarter of 2013. The Leviathan field is expected to start production in 2017.

Natural gas consumption has grown from zero in 2000 to 5.3 billion cubic meters (BCM) in 2010, of which at least 40 percent had been supplied by Egypt via an undersea pipeline running from el-Arish to Ashkelon in recent years. Since the overthrow of President Mubarak in March 2011, Egyptian supplies have been interrupted by the sabotage of sections of the pipeline in the Sinai Peninsula. In April 2012, the Egyptian side cancelled the contract, complaining of poor payments.

Imported coal — Israel has no indigenous reserves — has been the source of the bulk of domestic electricity generation since the early 1980s but is now being displaced by natural gas.

Israel has around 12,000 megawatts (MW) of electricity installed capacity. This is three times the capacity of the 1980s. The total primary energy intensity of Israel in 2008 was around 4,500Btu per (2005) US dollar of GDP. Between 1980 and 2000, the figure was between 5,000 and 6,000Btu per US dollar. The 2008 figure is a reflection of greater energy efficiency, a feature of more advanced economies.

The context of the policy debate has had a strong political element because of the emergence in the Israeli economy of powerful oligarchs with substantial investments in local oil and gas-related companies and considerable perceived influence on decision-makers.

Carbon dioxide emissions have also grown steadily. In 2009, the figure was 70 metric tons. Israeli public opinion is growing in its environmental awareness and supports laws and regulations which reflect these concerns.[1]

Government Policy

The Israeli Ministry of Energy and Water Resources indicates that "Israel, like many countries around the world, is encouraging a transition to natural gas as the primary energy source, with the many advantages it offers the consumer, the economy and the environment: reduced cost of electricity generation and of industrial products, less air pollution and greenhouse gas emissions, greater market competition and promotion of exports, and strengthening of Israel's economy."[2]

The Israeli government has been moving to make laws and regulations dating back to the 1950s more appropriate for its new-found hydrocarbon wealth. The context of the policy debate has also had a strong political element because of the emergence in the Israeli economy of powerful oligarchs with substantial investments in local oil and gas-related companies and considerable perceived influence on decision-makers. An additional major

[1] Based on data from the US Energy Information Administration. http://205.254.135.7/countries/country-data.cfm?fips=IS&trk=p1.

[2] Israeli Ministry of Water and Resources, http://energy.gov.il/English/Subjects/Natural%20Gas/Pages/GxmsMniNGEconomy.aspx.

concern has been the need to attract foreign technical skill and investment because of the advanced technology required and the considerable sums involved in even daily operations as well as wellhead and pipeline infrastructure.

Government policy is based on continuing growth in demand and the economy's transition to natural gas consumption. The government says "the highlights of the policy are securing a steady supply, issuing licenses for infrastructure development, encouraging competition, establishing safety criteria and tariffs, and ensuring consumer protection."[3]

Natural gas usage in Israel is projected to increase from 5.2 BCM in 2010, to 12.5 BCM in 2020, and to 18 BCM in 2030. The bulk, 85 percent, will go to electricity generation and to industry, with the rest possibly being used for transportation and methanol.

By 2030, natural gas consumption during peak electricity demand will be around 80 percent of Israel's energy needs.

In 2011, the government set up a committee, chaired by Professor Eitan Sheskinski, which proposed that the state should not alter the 12.5 percent royalty rate it charges companies that produce oil or gas in Israeli territory, including the offshore exclusive economic zone (EEZ), but instead should apply a levy on the profits of the companies. This levy would vary between 20 and 60 percent, depending on the size of the profits, but neither the royalties nor tax on profits should be collected until investors have recovered half of their capital. The committee, which submitted its report in December 2012, also recommended that the royalties and tax should not be retroactive. In January 2012, Israeli Prime Minister Binyamin Netanyahu announced that the committee's recommendations would be adopted in their entirety.

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[3] Israeli Ministry of Water and Resources, http://energy.gov.il/English/Subjects/Natural%20Gas/Pages/GxmsMniNGEconomy.aspx.

The Israeli government then set up a committee to consider government policy on the use of natural gas and, in particular, the priorities between maintaining a strategic reserve, use within Israel, and export. The Inter-Ministerial Committee for the Examination of Government Policy on the Israeli Natural Gas Economy, is known as the Tsemach Committee after its chair, Shaul Tsemach, the director-general of the Ministry of Energy and Water Resources, who was also one of the members of the Sheshinski Committee. It published its interim report in April 2012, recommending that the guiding principle should be that domestic need for gas must be assured before gas is exported.

The committee estimated Israel's gas reserves at 1,400 billion cubic meters (BCM — 1 tcf equals 28 BCM), although proven reserves are currently only assessed at around 750 BCM. (The 2010 United States Geological Survey report on the Levant Basin gave an estimated figure of 3,500 BCM for the whole area, including Cyprus, Lebanon, and Israel.) The committee said 400 BCM of natural gas should be secured for domestic demand until 2018. From 2018, the quantities allowed for export should be calculated on the basis of government forecasts for demand for 25 years. The committee estimated that Israel would need between 420 and 540 BCM until 2040.

The committee also recommended that fields containing more than 200 BCM should apportion at least 50 percent to the domestic market and only the residual 50 percent could be exported.

Restrictions Applied to Other Fields

Greater than 200 BCM	50 percent domestic	50 percent export
100 to 200 BCM	40 percent domestic	60 percent export
50 to 100 BCM	25 percent domestic	75 percent export

In addition, developers of the fields would be required to keep a further 15 percent of the gas as reserves and also connect the fields physically to the Israeli gas pipeline system.

In terms of export destinations, the committee recommended that Israel's regional neighbors should have priority as customers. The committee did not recommend

how gas should be exported, only that the export facility, whether on land or offshore, should be in territory under Israeli control.

The Tsemach Committee recommendations are not yet official government policy. Indeed, the committee was accepting public submissions until May 6. Its final report is due to be given to the government on June 7. The committee's provisional recommendations included that the issue of export options should be examined by a further inter-ministerial committee, headed by the director-general of the prime minister's office.

The export facility, whether on land or offshore, should be in territory under Israeli control.

In order to make up for the deficit in supplies caused by the cancelled sale of Egyptian gas to Israel, the state-owned Israel Electric Corporation (IEC) issued an international tender in April 2012 for the supply of 16 cargoes of LNG, which would be unloaded at a floating regasification plant off Israel's Mediterranean coast at Hadera, the site of a major power station. The gas, estimated to be valued between $700 million and $850 million, would be delivered from December 2012. The winning tender would have to bring two LNG tankers a month for five months, by which time gas from the Tamar field should be coming on stream. There is an option of six more tankers if the contract needs to be extended.

Israel's Natural Gas Authority is anticipating that 26 LNG tanker-loads will be needed, with the IEC having priority to receive an extra ten if needed.

Noble Energy

The Houston-based Nobel Energy company has been crucial to the discovery and development of Israel's offshore natural gas reserves.[4] The company has been operating offshore in the Mediterranean since 1998, discovering six fields, including the Aphrodite field belonging to Cyprus, which lies close to Israel's EEZ. A production platform for the Tamar field is being completed at Corpus Christi in Texas and will be floated to Israel for installation in late 2012.

Working Interests of Noble Energy

Aphrodite (Cyprus)	70 percent
Tanin	47 percent
Mari-B	47 percent
Noa	47 percent
Leviathan	40 percent
Tamar	36 percent
Dalit	36 percent

In addition, Noble Energy has a 47 percent interest in the Ashdod Onshore Terminal (AOT).

The principle Israeli energy company involved is Delek Group, which also operates through its subsidiaries, Delek Drilling and Avner Oil and Gas.

Delek and Subsidiaries Involvement

Mari-B	52.9 percent
Noa	52.94 percent
Leviathan	45.67 percent
Tamar	31.25 percent
Dalit	31.25 percent

Apart from Mari-B and Noa, the newly found gas fields are in deepwater. Tamar, more than 50 miles off Haifa, is in water 6,000 feet deep. The smaller Dalit field, on the same latitude, but 25 miles from Haifa, is in water 4,000 feet deep.[5]

The success of the working partnerships between Israeli companies and Noble Energy has been a great bonus but also demonstrates the lack of success so far in attracting other foreign companies. Israeli government policy on the development of new natural gas resources has been to let commercial companies take the lead, while operating within the parameters of Israel's own view of its strategic needs.

[4] Noble Energy: http://www.nobleenergyinc.com/operations/international/eastern-mediterranean-128.html.

[5] Gaza Marine, adjacent to Mari-B and Noa, is in comparatively shallow water. The reserve is 10 percent owned by BG Group — formerly, British Gas — with the remaining 10 percent owned by CCC, a Palestinian-Lebanese investment company. Because of concerns on how Hamas, which controls Gaza, would use any revenues, the Israeli government is against any exploitation at present, as is the Palestinian Authority in the West Bank. The field is estimated to contain around 1 tcf.

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Despite the lack of visible differences in objectives between the Israeli government, Noble Energy, and its Israeli commercial partners, there is tension in this relationship. Noble Energy wants to commercialize the newly discovered reserves as quickly as possible, while the Israeli government will want to take a more cautious and slower approach. Noble Energy's official approach, announced at the presentation of its first quarter 2012 figures, is that "[gas] exports will contribute significantly to Israel's energy security and economic growth."

Attracting other oil and gas companies is beset with political challenges. Most international oil and gas companies have operations in other parts of the Middle East and, while the Palestinian dispute remains unresolved, such companies probably do not want to politically jeopardize their operations by also being active with Israel. In addition, companies working in Turkey and Lebanon will probably not wish to be involved with Israel until maritime border issues with Cyprus and Israel are settled. For example, Turkey is an important market for Gazprom, buying around 30 BCM.[6]

Attracting other oil and gas companies is beset with political challenges.

Domestic Options

Apart from expanded use of natural gas for domestic electricity generation and power for industrial plants, Israel is also considering using the natural gas as a feedstock to expand its chemical industry and as an alternative transport fuel. Israel already has ambitious plans for electric vehicles. It is also considering the development of other transport fuels, such as GTL (gas to liquids), CNG (compressed natural gas), and methanol. Apart from reducing Israel's demand for gasoline, such options are also being considered to make Israel a market leader in non-gasoline transport fuels.

Export Options

The following options are or have been under consideration:

- An LNG plant on Israel's Mediterranean coastline. This would have the advantage of security but the idea is opposed by environmentalists. An additional constraint could be that LNG tankers taking on Israeli gas in the Mediterranean may not be allowed free passage through the Suez Canal by the Egyptian authorities. Such interference with shipping would be against the treaty controlling the use of the canal, but Egypt, either commercially hostile to Israeli LNG competing with Egyptian LNG exports or politically hostile to Israel itself, might devise "safety" checks on Israeli cargoes to delay or stop them.
- An LNG plant on Israel's Red Sea coast near the port and tourist city of Eilat. This would be closer to natural gas markets in India and Asia but is opposed by environmentalists. Limited land area might mean the plant would have to be smaller than commercially logical. A plant would also be vulnerable to terrorist or rocket attack from nearby Egypt, Jordan, and Saudi Arabia.
- An LNG plant on the southern coast of Cyprus, operated jointly with Cyprus. This would give control of Israel's gas exports to another country. It would also be affected by any Egyptian restrictions put on Israeli LNG cargoes passing through the Suez Canal destined for Asian markets.
- A floating LNG terminal (FLNG), located above or close to the Leviathan field. Such a facility, though, would be hugely expensive and be hard to protect from terrorist or military attack. Although locating the facility at sea would overcome environmental objections to an LNG plant on Israel's Mediterranean coast or the local environmental and diplomatic problems with locating it on Cyprus, other factors are overwhelming. The technology of FLNG is commercially untested and, being in deep water, there would be weather-related downtime. This would mean the supply commitments would have to be flexible. A further problem, as with all the Mediterranean basin LNG proposals, is potentially problems with the passage of cargoes through the Egyptian-controlled Suez Canal.
- Making use of spare LNG capacity at Egyptian facilities. Although the commercial logic is attractive, the political

[6] MEES (Middle East Economic Survey) www.mees.com. The Levant Basin Energy Report, published by The Delphi Global Analysis Group www.dganalysis.com.

hurdles, especially since the 2011 overthrow of the Mubarak regime, are probably insurmountable.

- A gas pipeline to Cyprus connecting with a pipeline running north across the island and then undersea to Turkey, where it could join the network of the transit pipelines serving the European market. In the absence of political constraints, this option has the best commercial logic, being the cheapest and quickest to construct, as well as connecting to the closest and largest market. But this route would give control of Israel's gas exports to two countries — Cyprus and Turkey — which do not have good relations with each other and, in the case of Turkey, also have poor relations with Israel.
- An undersea electric power line to Cyprus and Greece, thereby joining the Israeli grid to the European grid. Known as the EuroAsia Interconnector, the cable would have a capacity of 2,000 MW. In March 2012, Israel and Cyprus signed an accord to lay this underwater cable. At 540 miles long, and lying at a depth of more than 6,000 feet, the cable would be the longest in the world.
- Gas pipelines to the Palestinian Authority in the West Bank and/or to Jordan. Politically, Israel labels these options as being the most "immediate" but, since the April 2012 cancellation of the Egyptian contract to supply gas to Israel, the notion of commercial contracts underpinning diplomatic reconciliation is in doubt. From a Palestinian or Jordanian point of view, such a contract would have to be accompanied by a U.S. guarantee. From an Israeli perspective, a U.S guarantee of payment would certainly be wanted.

Government Structure

Israel's Ministry of Energy and Water Resources (formerly the Ministry of National Infrastructures) is responsible for issuing licenses for exploration and production both onshore and offshore in the area that Israel regards as its exclusive economic zone. The key official position is that of the petroleum commissioner. Licenses can vary, depending, for example, on whether oil or natural gas or shale oil is being likely to be found.

The Natural Gas Authority, within the ministry, is responsible for allocating natural gas supplies. Apart from the requirements of the IEC and major industrial plants, a low pressure natural gas infrastructure is being developed, designed for small industrial plants as well as hotels, launderettes, and restaurants.

An increasing proportion of the area has been surveyed. Natural gas has been found in several areas offshore and there is a strong likelihood of oil being found in commercial quantities as well.

Israel's Natural Gas Fields

Leviathan	17.0 tcf
Tamar (production 2013)	9.0 tcf
Dolphin	0.1 tcf
Dalit	0.5 tcf
Tanin	1.2 tcf
Mari-B (near depletion)	1.1 tcf
Noa (production 2012)	0.04 tcf
Total	28.0 tcf
Total including Cyprus	35.0 tcf

Infrastructure

Israel currently uses natural gas in some of its power stations and industrial plants. There is no natural gas supply to individual homes. The natural gas pipe network extends along the Mediterranean coast and inland, and brings gas ashore at Ashkelon and Ashdod. In the south of the country, the line from Ashkelon (where until April 2012, Egyptian gas arrived) extended to power plants or industrial facilities at Eitan, Ramat Hovav, Rotem, and Sdom, near the Dead Sea. Ashkelon is also connected to Ashdod, where gas from the Mari-B field is brought ashore, and where, starting in 2013, gas from the Tamar field will also arrive. Inland from Ashdod and Ashkelon, pipelines connect with power plants at Zafit and Gezer. The line to the north currently runs offshore, connecting with power plants in north Tel Aviv, Hadera, Dor, and Hagit. There are plans to expand the pipeline network. In the south, there will be a link to Zin in the Negev desert. In the north, a pipeline will run on land parallel to the coastline, running from Gezer to Hagit, and then on to Haifa. A spur would run south-east along the Jezreel valley to Alon Tavor and Afula, and then to the Jordan valley.[7]

Israel has plans for two facilities on its northern coastline at which natural gas can be brought ashore. Despite local and environmental opposition, the government intends to force through approval for sites of two gas-receiving installations. Apart from being geographically logical because

[7] The spur to the Jordan valley could facilitate future natural gas exports to Jordan, as could the southern pipeline. Currently, there are no projected gas pipelines into territory controlled by the Palestinian Authority on the West Bank.

both the Tamar and Leviathan fields are on approximately the same latitude as the northern Israeli port city of Haifa, the new facilities would also avoid the present need to run pipelines south to Ashdod, the current point where gas is brought ashore.

Israel is able to refine and process 100 percent of its oil requirements using its refineries in Ashdod and Haifa. Gas processing, a less complicated process, is handled at Ashkelon, Ashdod, and Hadera.

Relations with Other Countries

The development of Israel's natural gas resources has impacts on relations with all its neighbors.

Cyprus

Israel's Leviathan field is close to Cyprus' Aphrodite field, estimated to contain 7 tcf. Both countries have signed agreements covering security and energy cooperation. The question of mutual exploitation is yet to be resolved. One idea is for gas from Leviathan and Aphrodite to be brought ashore in Cyprus and processed into LNG for export by tanker. But Israel is reluctant to be dependent on another state for the export of its natural gas and so is considering a floating facility. For Cyprus, quantities discovered so far in the Aphrodite field would not usually be considered sufficient to commercially justify the building of an LNG plant. Initial quantities of natural gas brought ashore will be used to fuel a new power station being built at Vassilikos, replacing a power plant badly damaged by explosions at the adjacent military base in 2011. The Aphrodite field lies in waters that the so-called Turkish Republic of Northern Cyprus claims. This position is backed by Turkey, which has protested at cooperation between Cyprus and Israel on energy.

Lebanon

A state of war exists between Lebanon and Israel. There is no formal agreement recognizing the United Nations-drawn line on land between them as being the official border. In 2007, Lebanon and Cyprus agreed on a maritime border. In 2010, Israel and Cyprus also agreed a maritime border. Lebanon did not 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. The result is that both Lebanon and Israel have a different idea of where the notional maritime boundary between the two states lies. The difference is a pie-shaped piece of sea 330 square miles in size where their declared EEZ's overlap. In 2010, Lebanon submitted its proposed maritime boundary to the United Nations. Israel submitted its view to the UN in 2011. U.S. diplomats have been active trying to resolve the issue but have yet to announce progress. Although the prospect of diplomatic relations between Israel and Lebanon seems unlikely, an interim arrangement whereby gas exploration companies could survey and perhaps even drill in the disputed area is more likely. Reportedly, Israel is hoping soon to resolve the dispute, but resolution without one or both sides making a territorial concession seems impossible.

Israel is reluctant to be dependent on another state for the export of its natural gas.

Palestine (Gaza Strip)

Natural gas was discovered in the Mediterranean Sea off Gaza in 2000 but remains untapped. Israel has blocked development, saying that the gas should come ashore on its territory. Since Hamas seized power from the Palestinian Authority in 2006, there have been no talks on the issue. The Palestinian Authority claims Israel's Mari-B field extends into the offshore territory of Gaza. Currently, electric power in the Gaza Strip comes from a small power station running on diesel fuel and direct provision from the Israeli grid.

Palestine (West Bank)

The western edge of the Palestinian territories of the West Bank joins with a part of Israel where there are reports of shale oil deposits. Ownership is likely to be contentious if the deposits can be extracted commercially. Electric power in the West Bank is provided from Israel. If assured of guaranteed supplies of Israel gas, the Palestinian Authority could build its own power stations.

Egypt

The southern line of Israel's EEZ abuts Egyptian waters. So far, there have been no oil or gas deposits found in this area, but Shell is looking in the area known as North-East Mediterranean Sea Deep. Given the political uncertainty in Egypt following the overthrow of the President Mubarak in 2011 and the subsequent cancellation of the contract to supply Egyptian gas to Israel, any hydrocarbon find along the mutual boundary is potentially contentious.

Jordan

Like Israel, Jordan has suffered from interrupted supplies of natural gas from Egypt following the 2011 downfall of the Mubarak regime. Indeed, Jordan has been affected more because of its greater dependence on this source of energy. To replace uncertain Egyptian supplies, a logical step would be to secure supplies from Israel, once the Tamar field comes on stream in 2013. But such an arrangement would be politically unpalatable to the Jordanian public, so Amman is currently considering importing LNG from the Gulf state of Qatar. Iran has also offered supplies but does not produce LNG and there is no prospect of a pipeline being built to Jordan across Iraq.

Security Concerns

All parts of Israel are vulnerable to military or terrorist attack. Offshore energy installations have particular vulnerabilities, which will increase as the number of installations increase and the challenge of protecting them mounts. Ships, boats, and helicopters supporting the offshore operations are also potential targets. The actual production of natural gas will probably be comparatively safe as the main fields have been discovered in very deep water. But the operations become more exposed to threats nearer to the shore. The production platform for the Tamar field, where initial processing of the gas take places, will be located offshore Ashdod, near the Mari-B production platform. Costing around $1 billion and 250 meters high, it would make an attractive target for Israel's enemies. Apart from guards on the rigs and patrol boats in the nearby water, Israel is said to be considering the placing of anti-aircraft missiles on the installations, although the use of such weapons would clash with safety standards imposed because of the danger of igniting the natural gas, which is highly inflammable.

Offshore energy installations have particular vulnerabilities, which will increase as the number of installations increase and the challenge of protecting them mounts.

The security problems involved with a floating LNG facility (FLNG) near the Leviathan field would be far greater because of the size and value of the vessel. Potentially located 100 miles off the Israel coast, it would be vulnerable to terrorist attack from Lebanon or Syria. The Leviathan field also lies close to the Israel-Cyprus maritime border, which is not recognized by Turkey. Turkish warships have patrolled those waters to emphasize Ankara's point of view and are also reported to have carried out live fire exercises there.

Israel's onshore installations are also vulnerable. The gas-receiving facilities at Ashdod and Ashkelon are within range of rockets that can be fired from the Hamas-controlled Gaza Strip. Hezbollah forces in Lebanon have missiles capable of reaching targets almost as far south as Tel Aviv, as well as many rockets that can reach the northern port city of Haifa, the main industrial area in Israel. In the south, the port city of Eilat on the Red Sea, a prospective site for an LNG plant catering for the Asian market, is within range of rockets from Jordan and Egypt. A number of Grad type Katyusha rockets fired from Sinai have landed there.[8]

Anti-missile systems give some measure of protection to such threats but could be overwhelmed in a full-scale conflict. From an Israeli point of view, deterrence is maintained by the ability and readiness to use overwhelming force in the face of a threat.

The major involvement of Noble Energy in exploration and production in both Israeli and Cypriot waters could give the United States additional motivation to become diplomatically and militarily involved in Eastern Mediterranean offshore natural gas development. The U.S. Navy, along with the navies from Israel and Greece, participated in a joint naval exercise in the area in early 2012. The exercise also included a Cypriot element, although Cyprus lacks a navy and only has a small coastal defense force.

However, the involvement of U.S. forces in the area could cause difficulties with Lebanon, Egypt, and Turkey, who could view such activity as diplomatically unfriendly. Turkey's membership of the NATO would be an additional complication.

[8] See Michael Leigh, "State Failure in North Africa," http://blog.gmfus.org/2012/04/state-failure-in-north-africa/

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Conclusion

Israel's initial euphoria at its huge offshore natural gas discoveries in 2009 and 2010 is now being tempered. The April 2012 cancellation of Egyptian natural gas deliveries has exacerbated a domestic supply shortage caused by the depletion of smaller offshore reserves. Circumstances will only improve when the Tamar field comes on stream in the second quarter of 2013. In the meantime, the potential munificence of the Leviathan field, which should allow for Israel to become an exporter, is being constrained by geological, technological, and diplomatic challenges.

Scientific advances have helped to find the natural gas deposits and technological innovation is enabling the fields to be exploited at extreme depths. But the simplest and apparently obvious commercial choices are beset by problems. Cooperation with Cyprus — Israel's new regional partner — and with Greece is annoying to Turkey. The euro zone crisis and uncertainty about the sustainability of Greek debt will have an impact on Cyprus, which is highly exposed to Greek debt as one of Greece's largest trading partners. Such developments hinder government decision-making and may limit investor confidence in the future.

Israel's decision to place any natural gas export facility in territory under its control is a predictable and understandable response. But it points to the choice of LNG being the preferred option rather than a gas pipeline. Yet an LNG plant needs to be positioned within a mile or so of the port where tankers can be loaded, requires a site of at least 40 to 50 acres in size, and would involve an investment of $10 billion or more. Such an investment would need the direct participation of a major energy company prepared to put at risk its relations with other commercial partners in the Middle East.

The formation of a numerically stronger coalition in Israel rather than the calling of early elections could give the country two years of relative political stability during which decisions can be made on its best natural gas options. Because of the long lead times on energy infrastructure projects, early decision-making is vital if the present progress on developing reserves is to be continued. A stable government with a strong parliamentary majority is also vital to passing legislation which will permit controversial developments that have already prompted domestic opposition on environmental grounds.

A stable government with a strong parliamentary majority is vital to passing legislation which will permit controversial developments that have already prompted domestic opposition on environmental grounds.

The keys to an early, smooth, and commercially sound policy on natural gas therefore remain mainly in the hands of the Israel government. The issues are complex and the options have downsides, including major geological and scientific challenges. The Israeli government deserves praise for developing laws and bureaucratic structures to deal with its changing energy fortunes but the success or failure of its evolving policies has yet to be determined.

Historic and Future Timeline

1999	Noa gas field discovered off Israeli city of Ashdod (Jun).
2000	Mari-B gas field discovered near Noa field (Feb). Gaza marine field discovered offshore Gaza.
2003	Cyprus and Egypt sign a maritime delimitation agreement.
2004	Mari-B field comes on stream, supplying gas to Israel.
2007	Cyprus and Lebanon sign a maritime delimitation agreement.
2008	Egypt starts to supply gas to Israel via an undersea pipeline between el-Arish and Ashkelon.
2009	Noble Energy discovers the Tamar gas field in Israel's offshore waters (Jan). Dalit gas field discovered in Israel's offshore waters.
2010	Lebanese parliament passes a hydrocarbons law. Cyprus and Israel agree a maritime delimitation agreement (Dec). Leviathan gas field discovered in Israel's exclusive economic zone (Dec).

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2011	Lebanon protests to UN that Cyprus-Israel agreement is a violation of its sovereignty (Jun). Israel informs the UN of what it regards as its offshore border with Lebanon (Jul). Turkish Prime Minister Erdogan visits Turkish Republic of Northern Cyprus (Jul). Drilling begins in Block 12 of Cyprus EEZ (Sep). Israel signs contract for offshore LNG import terminal (Oct). Lebanon write to UN identifying points along its southern maritime border (Oct). Israel sets up inter-ministerial committee to devise a natural gas policy (Nov). Israeli President Shimon Peres goes on a state visit to Cyprus (Nov). Cyprus announces gas find in Block 12 (Dec).
2012	Lebanon says it will issue offshore drilling tenders within three months (Jan). Israel announces a new gas find in the Tanin 1 well, close to maritime border with Cyprus (Feb). Israel's inter-ministerial committee on natural gas policy starts work (Feb). Israel's LNG import facility due to start operations (Dec).
2013	Israel's Tamar field, serving domestic market, due to come on stream (second quarter).
2017	Israel's Leviathan field, serving export market, due to come on stream.

About the Author

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