



Samuel Neaman Institute
for National Policy Research

Israeli Oil & Gas Sector

Economic and Geopolitical Aspects:

Distinguish between the Impossible, the Potential and the Doable



Gina Cohen

Miki Korner

April, 2016

ABOUT THE SAMUEL NEAMAN INSTITUTE

The Samuel Neaman Institute was established in 1978 in the Technion at Mr. Samuel Neaman's initiative. It is an independent multi-disciplinary national policy research institute. The activity of the institute is focused on issues in science and technology, education, economy and industry, physical infrastructure and social development which determine Israel's national resilience.

National policy research and surveys are executed at the Samuel Neaman Institute and their conclusions and recommendations serve the decision makers at various levels. The policy research is conducted by the faculty and staff of the Technion and scientists from other institutions in Israel and abroad and specialist from the industry.

The research team is chosen according to their professional qualifications and life achievements. In many cases the research is conducted by cooperation with governmental offices and in some cases at the initiative of the Samuel Neaman institute and without direct participation of governmental offices.

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The chairman of Samuel Neaman Institute is professor Zehev Tadmor and the director is professor Omri Rand. The institute operates within the framework of a budget funded by Mr. Samuel Neaman in order to incorporate Israel's scientific technological economic and social advancement.

Mailing address:

Samuel Neaman Institute, Technion City, Haifa 32000, Israel

Phone: 972-4-8292329

Fax: 972-4-8231889

e-mail: info@neaman.org.il

Website : <http://www.neaman.org.il/Neaman>



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This document was offered by the authors for publication as a Samuel Neaman Institute (SNI) report. While the study was not conducted at SNI, it deals with a national policy subject of much interest. The report was reviewed internally at SNI and is being published under the framework of the SNI project Clean Energy Innovation Policy in Israel.

Prof. Gershon Grossman, Senior Research Fellow, Project Leader

מסמך זה הוצע ע"י מחבריו לפרסום כדו"ח של מוסד שמואל נאמן. אמנם המחקר לא בוצע במוסד נאמן, אך הוא עוסק בנושא של מדיניות לאומית בעל עניין רב. הדו"ח עבר תהליך שיפוט פנימי במוסד נאמן ומתפרסם כחלק מן הפרויקט: מדיניות חדשנות בתחום אנרגיה נקיה בישראל.

פרופ' גרשון גרוסמן, עמית מחקר בכיר, ראש הפרויקט

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Executive Summary in Hebrew and English

תקציר מנהלים: סקירת משק הגז הטבעי בישראל בהקשר הבינלאומי, מאי 2016:

לאחר כשנה וחצי של דיונים וויכוחים של כל הנוגעים בדבר (ממשלה, רגולטורים, ציבור, חברות גז וצרכנים) שהתנקזו למסמך שנקרא "מתווה הגז" הגיע זמן היישום. כלומר, מימוש ההחלטות והנעת התהליכים כדי להשיג את התועלות הכלכליות, הסביבתיות, החברתיות והגאופוליטיות, מתגליות הגז הטבעי במים הכלכליים של ישראל. מצאנו לנכון להציג תמונה עדכנית של שוק הגז הטבעי העולמי והישראלי והשינויים שהתחוללו מאז תחילת הדיונים על המתווה.

בסקירה נכלל שוק הגז העולמי לנוכח הטלטלה הגדולה בשנה וחצי האחרונות שהשפעתה ניכרת בשווקי היצוא הפוטנציאליים הרלוונטיים, וכיוון שניתוח המגמות הללו תסייע בהבנת השפעתן האפשרית על המשק המקומי. בהקשר זה נותחו מספר חלופות לשיתוף פעולה אזורי באמצעות יצוא גז טבעי מישראל. בשוק המקומי נסקרו היתרונות של השימוש בגז טבעי בתחום החשמל, התעשייה, התחבורה וכן ההשקעות שנעשו ואילו המתוכננות. וכן נסקרה השפעת של ירידת מחירי הנפט על כלכלת ישראל.

מטרת המסמך הייתה לסקור את המגמות והתהליכים כדי לשמש בסיס להמשך הדיון מקצועי. ואולם, הועלו גם מספר המלצות ראשוניות לצעדים מעשיים. להלן חלק מההמלצות במסמך:

1. הגדלת הצריכה של גז טבעי במשק המקומי, בעיקר באמצעות החלפת השימוש בפחם לייצור חשמל. ניתן להפחית עד 10.9 מיליון טון של פחם ולצרוך כ-6 BCM נוספים של גז טבעי בשנה
2. הקמה של מחז"מים יעילים לייצור חשמל, כדי לאפשר את הפחתת השימוש בפחם
3. הרחבת מערכת ההולכה של הגז הטבעי כדי להגדיל את גמישות האספקה
4. עידוד הקמת מערכות החלוקה והסבת מפעלי התעשייה –400 מפעלים נוספים עד 2020
5. תמיכות ינוקא במאגרים נוספים והקמת תשתיות משותפות כדי לאפשר את חיבורם
6. הסרת חסמי היצוא

המסמך מעלה מספר נושאים ושאלות ומטרתו לשמש כזרז להמשך דיון.

Executive Summary: Review of the Israeli gas market in the international context, May 2016:

After a year and a half of debates and arguments between all relevant parties (government, regulators, public, gas companies and consumers) which culminated in a document called "the gas outline," it is has come time for implementation.

That is, carrying out the decisions and getting the processes started in order to gain the economic, environmental, social and geopolitical benefits of the gas discoveries in Israel's EEZ.

We thought it right to present an updated picture of the Israeli and global gas markets and the changes that have taken place since the start of the deliberations on the gas outline.

The review includes the global gas market as it has experienced considerable turmoil over the last year and a half, the effects of which are evident in the relevant potential export markets for Israeli gas, and because the analysis of these trends will help in understanding their possible impact on the domestic market.

A number of alternatives for regional cooperation by means of gas exports from Israel were examined.

In the domestic market, we reviewed the advantages of using natural gas in the electricity, industrial and transportation sectors, as well as the investments that have been made and those that are planned. In addition, we reviewed the impact of the drop in oil prices on Israel's economy.

The purpose of the document was to review the trends and processes so they can serve as a basis for further professional debate.

However, several preliminary recommendations for practical steps were also made. Following are some of the recommendations of the document:

1. Increase the consumption of natural gas in the domestic market, mainly by replacing the use of coal for electricity generation. Up to 10.9 million tons of coal can be reduced and an additional 6 BCM a year of gas can be consumed.
2. Construct efficient combined cycle power stations (CCGTs), in order to enable the reduction of the use of coal.
3. Expand the gas transmission system to increase the flexibility of supply.
4. Encourage the construction of distribution networks and the conversion of about 400 additional industrial plants by 2020.
5. Provide infant industry protections to additional reservoirs and set up joint infrastructure to enable their connection.
6. Remove export barriers.

The document raises several issues and questions and is designed to serve as a catalyst for further discussion.

Introduction

In this document we will present a review of the Israeli oil and gas sector. We will look at how Israel is affected by changes in global energy trends, what has been the impact on the country from the oil price decline, the financial benefits of the gas discoveries on the Israeli economy, the options for regional cooperation via exports of natural gas from Israel to the countries in the region and some of the inherent geopolitical aspects. We will examine the above in the context of global energy trends.

In addition, the authors will provide some of their views on what could be done to promote and develop the Israeli gas discoveries and the Israeli gas market to the benefit of the State of Israel.

Contrary to the past when Mari-B, Noa, Egyptian gas and Tamar gas fields needed to be developed (or infrastructure constructed for EMG's Egyptian gas) when the State owned credit worthy electricity utility Israel Electric Company (IEC) was an anchor buyer to ensure the development of all these fields/options, today for the development of Leviathan, Tanin/Karish and future discoveries that might be made, there is no such anchor buyer in the Israeli market. Indeed, the local Israeli market, under its current form of consumption capacity can mostly be met by Tamar for at least 20 years (if the infrastructure is expanded). Nevertheless, it is clear that all supplies coming from one field and one infrastructure system does not provide in any sense sufficient security of supply, which is the most important aspect of the energy market, especially since Israel's electricity production is based on natural gas (over 50% of its fuel mix).

The lack of a readily available market causes huge complexities insofar as developing natural gas fields in greenfield markets. This impediment has been made tenfold more complex by the nationalistic / political fervor that has developed vis-à-vis the gas discoveries and the gas companies as reflected by the aggressive tone of the debates during the Sheshinski committee and enactment of the Fiscal Law in 2011, the Zemach committee and the enactment of the government's decision on exports in 2013, and the 18 months on the gas outline, on matters of the process thereof of passing the outline, ownership structure of the fields, competition, pricing of gas, redundancy, security of gas, taxation on exports and the stability clause. A huge amount of this nationalism stems, in our view, from (1) political motives and (2) a deep misunderstanding of natural gas markets.

All these issues have taken place whilst the global oil and gas market has undergone its own earthquake since June 2014 when oil and gas prices have tumbled by about 70% and then recovered over 50% from its low in February 2016 to a very volatile level (presently the oil price is less than half of its price two years ago). In addition, price free-fall and uncertainty are even more complex for natural gas than it is for oil, because huge upfront capital expenditure is required before any return on investment is made. In a world described as being "awash with oil and gas" and where prices will remain "lower for longer", it becomes very complex to secure

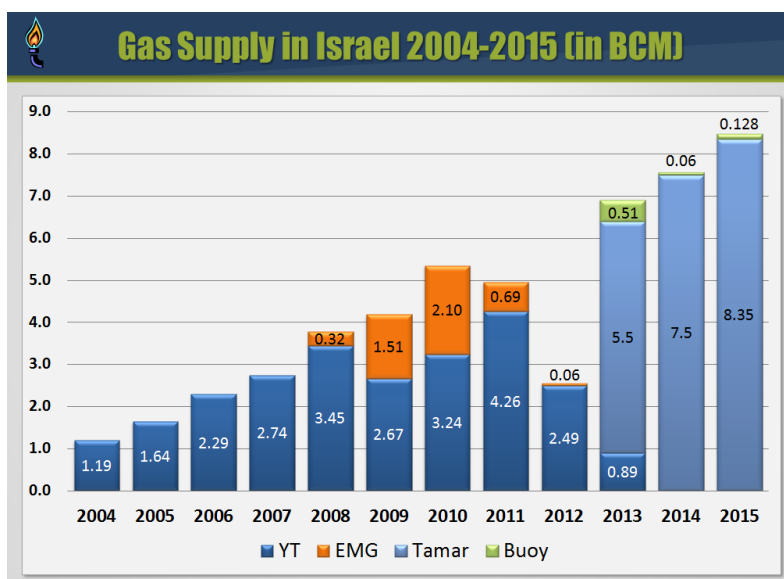
reliable long term buyers for Israeli gas. The gas companies operating in Israel today must all raise the finances to develop the fields and the marketing transmission facilities. Financial institutions are both more conservative in nature than gas entrepreneurs and have a plethora of oil and gas projects around the world to choose to invest in.

Exporting gas in general and from Israel in particular which appeared to be a non-brainer until 2 years ago with options ranging from exporting via Liquefied Natural Gas (LNG) to the then high priced Asian markets (prices north of \$15 per mmbtu) and the ability to attract world class partners, or exporting to the regional market by pipeline (Palestine, Jordan, Cyprus, Egypt, Turkey) have all become far more complex (albeit still feasible under the right circumstances and if the right measures are taken with state help). As oil and gas companies worldwide are finding it harder to access resources, and with oil and gas majors slashing capital spending by 30% to 40%, all projects are experiencing greater difficulties and uncertainties.

Background on Israel's oil and gas sector

In June 1999, Israel made its first natural gas discovery with the tiny Noa field, followed in February 2000 by the larger 30 bcm Mari-B reservoir, which started to supply gas to the Israeli market in 2004. Within a few years, gas became a major if not primary source of fuel for electricity generation and for large industries in Israel. Over the last few years, much deeper (+ 5,000m reservoir depth in 1,600-1,700m of water depth) but also larger structures of natural gas were discovered in the Miocene layers, with proven reserves reaching about 1,000 bcm (primarily the Tamar and Leviathan fields discovered in 2009 and 2010, but also including some smaller fields: Dalit, Tanin, Karish, Dolphin and Shimshon).

See table below on gas supply. The table was made by Gina Cohen based on data from the Natural Gas Authority in the Ministry of Energy.



To date, no significant commercial quantities (1,000 bbl/d from Givot Olam's onshore discovery) of oil have been discovered in Israel and so the country imports most of its crude oil and refines the fuel products it consumes (200,000 bbl/d for domestic use and exports of 60,000 bbl/d distillates). Israel imports most of its crude oil from countries of the Former Soviet Union (FSU), via the Baku-Tbilisi-Ceyhan pipeline, connecting the Caspian Sea with the Mediterranean and passing through Georgia and Turkey.

Israeli Energy Sector - Current

In 2015, Israel's primary energy consumption came mainly from petroleum and other liquids (42%), coal (27.5%), and natural gas (30%). Israel consumed 200,000 barrels per day (bbl/d) of oil and 8.43 bcm a year of natural gas out of which 0.13 bcm was LNG (total gas supply for 2014 was 7.56 bcm including 0.06 BCM of LNG)¹.

Insofar as the electricity sector is concerned, in 2014 and 2015 about 50% of the country's power generation came from gas produced locally, 2% from renewable - mainly solar - and the remainder from imported coal. 79% of the gas consumed in Israel in 2015 was for the power sector (77% in 2014). Going forward, increasing the percentage of electricity generated from natural gas will require both improved security of energy supply which requires connecting one or two additional gas fields and expanding the infrastructure together with the construction of new CCGTs (to replace coal).

In addition, for reasons of security of supply (until an additional gas field(s) is developed and connected to Israel), the Government of Israel decided to import LNG and thus since January

¹ Data has been collated from the Ministry of Energy, the CBS, Israel Electric Corporation and the PUA.

2013, the country has the ability to import LNG via a (Floating Storage and Regasification Unit (FSRU) moored offshore Hadera in central Israel. The facility can only supply about 590,000 mcm of gas/per hour and is thus for back-up and peak shaving purposes only, as can be seen from the tiny volumes of LNG that have actually been consumed.

Renewable energy in Israel currently only reaches 2%. This could arguably increase considerably after the Paris Summit and thanks to the growth in installation of PV solar energy systems after the sharp reduction in the cost of this technology, but has yet to be seen.

Over 60% of the oil and distillates that are consumed in Israel are used for land transportation with the entire sector run on oil-based distillates.

Israeli Economy

In order to put the energy economic aspects in their proper context, we are providing here below a very brief overview of the Israeli economy. It is important for us to emphasise that contrary to MENA countries and/or energy exporting countries, Israel's has a thriving economy based on established industry with a very reputable hi-tech sector. Thus, the natural gas sector on a whole will only ever comprise about 1%-3% of the country's GDP.

Israel's total exports amount to just under \$100 billion a year and growing. If the country manages to export 10 bcm of gas a year this would amount to an additional \$2 billion a year (based on a wellhead gas price of \$5.5/mmbtu).

The Israeli economy has enjoyed over a decade of good average economic growth of 4%-5% a year, including moderate growth during the 2008-2009 global financial crises, combined with a constant reduction of debt to GDP ratio and a reduction of the government's budget deficit. In 2015, Israel's economy grew by 2.6% after five years of higher growth.

See graph below from the Israeli Central Bureau of Statistics – (CBS).



In 2015, Israel's current account was the highest ever, with a surplus of \$14.3 billion amounting to 4.9% of GDP. The government's budget deficit for 2015 was \$4.3 billion, which accounted for 1.4% of the GDP (see above for energy perspective in general economy).

The overall government sector balance (the current account + capital account balance) in 2015 was a 2.1% deficit of GDP. In addition, according to a report by the CBS, published in January 2016, Israel's goods (excluding services) trade deficit narrowed to just \$7.75 billion last year, its smallest since 2011, as imports dropped and exports posted a modest increase. The import of goods fell in monetary terms by 6.8% to \$52.2 billion, mostly due to a sharp drop in world oil prices and the growing use of domestic natural gas for energy. As a result, energy imports plunged 36.6% last year.

Economic impact on Israel of the decline of oil prices and of the natural gas discoveries

The conversion over to natural gas in Israel combined with the fall in global oil prices, has, according to Bank Hapoalim, led to a dramatic fall in the dollar amount of energy imports into Israel from \$16 billion in 2012 (when there was a shortage of natural gas in Israel due to cut-off of gas from the Egyptian supplier), to \$14.6 billion in 2013, \$12.8 billion in 2014 and \$7.6 billion in 2015. The latest figure amounts to 2% of Israel's GDP. It has lowered the inflation, increased market activity and improved the balance of payments.

Indeed, according to Bank Hapoalim after deduction of the changes in the energy costs, the consumer price index in Israel would have increased by 0.1% in 2014 instead of falling by 0.2% as it did and in 2015 it would have increased by 0.4% instead of falling by 0.7% as it did.

For Israeli drivers, in June 2014, when Brent oil was traded at a \$115 a barrel, the Israeli driver paid 7.62 shekels (\$1.91) a liter for gasoline whilst in the first week of January 2016 when Brent had reached \$33 a barrel, he was paying only 5.63 shekels (\$1.42). Although the price of oil in the world has fallen in this same time period by 65%, the savings on gasoline in Israel amounted to 35%. The reason for this is the high taxation, relative to the end price, on gasoline in Israel based on volume and not price.

According to the Israeli Energy and Environmental Institute, in July 2014, average household petrol expenses were 1,562 shekels (\$393) a month, decreasing to 1,184 (\$298) by January 2016.

On the natural gas front, according to the Ministry of National Infrastructure, Energy and Water Resources, between 2004 and 2015, the country saved 43.8 billion shekels (\$11.2 billion), from not having to import coal and oil distillates. Going forwards, savings on imports will amount to \$3.3-\$7.5 billion a year, depending on the price of energy.

See table below by Miki Korner, former Chief Economist of the Natural Gas Authority within the Ministry of Energy, based on data published by the various divisions of the Ministry.

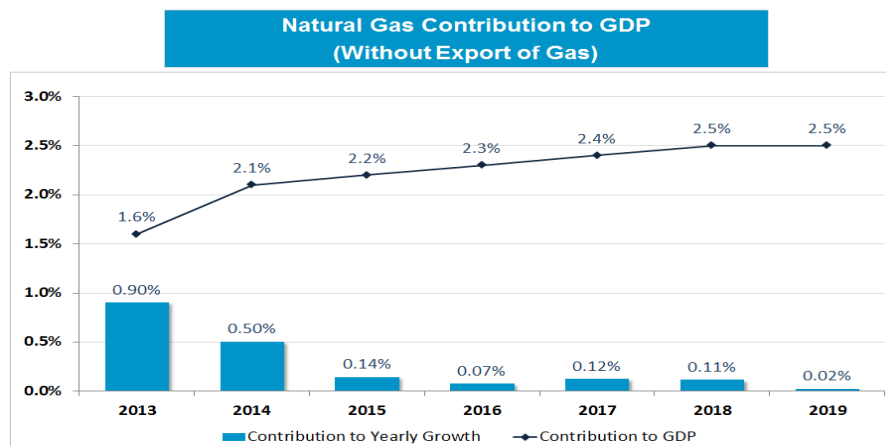
The volume of oil and coal consumption replaced by natural gas									
	BCM/y	mmbtu/y	The gas equivalent volume of oil replaced by gas (bcm/y)	bbl/y oil	Oil costs in million \$/y	The gas equivalent volume of coal replaced by gas.	coal kton/y	Coal costs in million \$/y	Oil + Coal costs in million \$/y
2014	7.5	271,739,130	6.0	51,271,534	5,086	1.5	2,363	209	5,295
2015	8.5	307,971,014	7.0	58,107,739	3,138	1.5	2,363	190	3,328
2016	9.7	351,449,275	7.0	66,311,184	3,866	2.7	4,253	352	4,218
2017	10.9	394,927,536	8.0	74,514,629	5,045	2.9	4,568	389	5,434
2018	11.7	423,913,043	8.0	79,983,593	5,215	3.7	5,829	511	5,726
2019	12.6	456,521,739	8.5	86,136,177	5,995	4.1	6,459	583	6,578
2020	13.3	481,884,058	8.5	90,921,520	6,755	4.8	7,561	703	7,459

Based on the following data and forecasts (updated for March 2016):

Forecast:	gas consumption	oil price \$/BBL	coal price \$/Ton+transport
2014	7.5	99.2	88.4
2015	8.5	54	80.3
2016	9.5	58.3	82.7
2017	10.5	67.7	85.1
2018	11.5	65.2	87.6
2019	12.5	69.6	90.3
2020	13.5	74.3	93.0
Reference: ...	NGA	wood Mackenzie	PUA2014+ World Bank forecast +transportation

According to the Ministry of Finance, the gas discoveries will contribute between 1.5%- 2.5% to the GDP every year over the next several years. This does not take into account exports of gas. Figures could range from 1% higher or lower depending on volume and speed of exports and the price of gas.

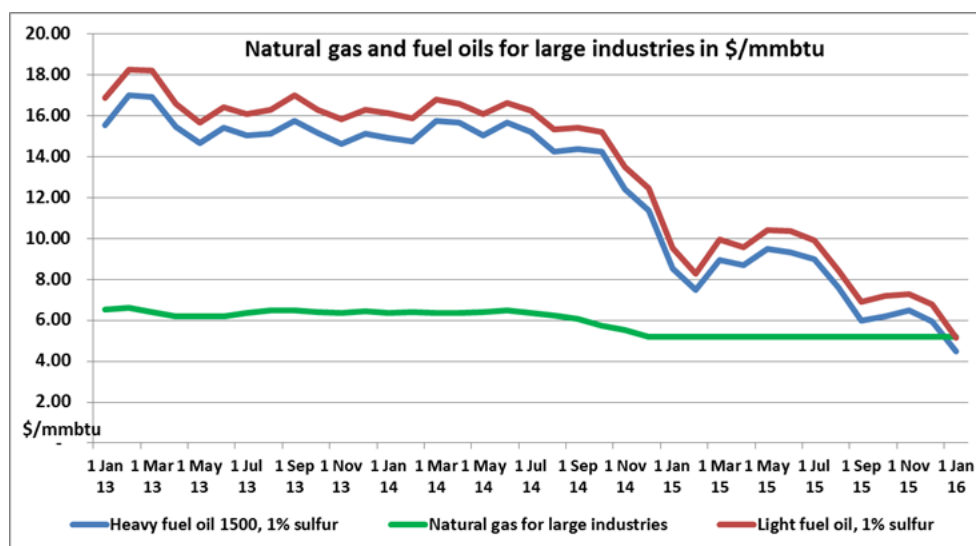
See graph below from Ministry of Finance, Department of the Chief Scientist.



In fact, the implications of the natural gas discoveries and the consequent reduction in energy imports and the reduced need to spend foreign currency for such imports, has had such a strong impact on the Israeli currency that the Bank of Israel has been constantly increasing its foreign reserves to offset the impact of too strong a Shekel for fear of the Resource Curse (described by the Financial Times as “the negative impact on an economy of anything that gives rise to a sharp inflow of foreign currency, such as the discovery of large oil & gas reserves”). By the end of December 2015, Israel’s foreign currency reserves exceeded \$90 billion for the first time ever.

However, we must also state that due to the sharp fall in global fuel prices during the first half of 2016, this has caused an anomaly in Israel’s industrial fuels consumption, since fuel oil prices are on a par and even below natural gas prices to industry.

Below please find a comparative graph of fuel oil and natural gas prices to Israeli industry between January 2013 and January 2016.



* The prices of HFO are based on data provided by the fuel division from the Ministry of Energy's monthly publications, plus known fees, infrastructure costs and taxes.

Fiscal policy on oil and gas

Since the fiscal policy on oil and gas taxation was amended in Israel in 2011, the Government's Take (GT - represents the division of profits over the full life of a field and includes years when profits are zero or when profits are high) from gas in Israel is up to 62% of the profits. The fiscal policy is based on royalties (12.5% of the wellhead price); the petroleum profit/Sheshinski tax (a progressive R-Factor based tax starting at 20% and progressively increasing to about 45%), and Corporate Tax (25%).

Below, we present a potential GT revenue graph.

Government income from taxes on gas in million \$/per year				
Average government's take/tax: 50% of revenue	within 5 years forecast		within 10 years forecast	
	Domestic market	Export	Domestic market	Export
BCM/Year	12	10	15	20
Average price MMBTU/\$	5.5	5.5	5.5	5.5
Revenues: million \$	2,391	1,993	2,989	3,986
Taxes : million \$	1,196	996	1,495	1,993
Domestic + export taxes million \$	2,192		3,487	

We have made our forecasts for the above table based on the following:

- Domestic volumes of gas consumed are based on the forecast prepared by the Natural Gas Authority within the Ministry of Energy. The quantities of gas we used are based on the lower limit of consumption forecast made by the Natural Gas Authority and the Ministry of Energy.
- Export volumes are based on two different consensus scenarios made by the private companies and by the government.
- The price of gas in Israel is based on the average price of gas in Israel. We used an average gas price of \$5.5/mmbtu, which is slightly above the May 2016 average prices, but it reflects the lower limit of gas prices over 20 years. For the export price at the wellhead, we simply extrapolated from the local price.
- Taxes are based on the existing fiscal regime for gas in Israel. We used a tax rate of 50% from the revenues, although the rate of taxes levied on the gas suppliers (royalties, corporate tax and the petroleum profit/Sheshinski tax) reaches a maximum rate of 62% after recovery of their capital expenses. In addition, a 2% excise tax is currently levied on natural gas. VAT is also levied on natural gas, but we did not take this into account, since it is also levied on imported fuels and so the impact of this tax is offset.

The reason that we based our current calculation on 50% is for conservative reasons, since over a period spanning 20-30 years of fiscal payments, many factors can change, such as: the gas price that determines the profitability, the tax rate itself that can change with one aspect that is currently being contemplated being an increase in excise taxes, technical and other risks that would entail additional investments, incidents, changing supply and demand fundamentals, competitive trends developing in the market, and other factors.

Investments in Israel's natural gas market

The recent natural gas discoveries offshore Israel are all in ultra-deep waters, leading to drilling costs of \$100-\$150 million per well. In the last decade about 20 such deepsea wells have been drilled offshore Israel, leading to the above mentioned discovery of c-1,000 bcm of gas.

The development of the Tamar gas field has cost to date about \$3.5 billion, for a total annual supply capacity of up to 12 bcm. The development of Leviathan, which has not yet commenced, is expected to cost about \$6-7 billion to provide an annual capacity of 16-18 bcm (or a lower cost if a smaller 12 bcm a year development is done for phase 1). It is currently estimated that Leviathan could be on line by 2019-2020, as well as the two smaller Karish and Tanin fields.

To date, the government owned Israel Natural Gas Lines (INGL) has invested \$1,200 million to construct about 550 km of pipelines, receiving terminals, PRMS stations and other facilities of the high pressure network and is about to invest another \$500 million by 2020. Expanding the natural gas infrastructure, from the high pressure transmission system, to the low pressure

distribution network and the conversion of 400 industrial and commercial consumers to natural gas is expected to cost another \$0.5-\$0.8 billion by 2020. Total gas consumption by industry in Israel could attain 2.5-3 bcm a year by the end of this decade, depending on fuel prices in the market.

The State is also examining options such as constructing new natural gas based industries, with an ammonia plant expected to be the first in line. If this proceeds as plan, it will be primarily for safety reasons, in order to remove the ammonia storage tanker located in the highly populated Haifa Bay. Some also estimate that there are prospects for methanol and gas to liquid (GTL) plants.

Insofar as the infrastructure required for the LNG regasification FSRU is concerned, \$150 million was invested for the buoy. The Excelsior regasification vessel is leased at an annual cost of \$70 million, on a 5 year contract which commenced in 2013. Options for extending the contract until 2022 and even leasing a second FSRU are being examined.

Of course there are concerns that some or all of the above mentioned future investments, as well as investment needed on capital intensive gas exports projects will not materialize, whilst other options may open up and a new industrial sector based on gas may evolve.

Environmental economic benefits of using gas instead of coal and oils

The chapter below relates to the environmental benefits of using indigenous gas rather than importing alternative oil and coal.

Although, the internal public debate within Israel on gas issues related only minimally to the economic or environmental aspects and benefits of gas to the country and focused instead mostly on ownership of the gas fields and distribution of wealth (upon the backdrop of the greater social debate on cost of living, social gaps and the rightful distribution of wealth that flared up in Israel in 2011), we nevertheless find it most pertinent to provide below the environmental and cost benefits of gas to the local market.

In order to evaluate and compare the environmental costs of using the different fossil fuel sources in Israel we estimated as follows:

- The quantity of coal and Heavy Fuel Oil (HFO) equivalent to 1 bcm of natural gas consumption used in Israel's electricity generation system, based on the average efficiency and hours of operation of each power plant, is as follows:

1 BCM of gas is equivalent to 2.7 million tons of coal or 1.17 million tons of HFO.

* The environmental costs of the above energy resources are based on a report prepared by the National Economic Council headed at the time by Prof. Eugene Kandel, entitled “The Economic Benefits of Renewable Energy”. The report evaluated the costs of pollutants (SO₂, NO_x, PM) and greenhouse gases (CO₂) from using different fossil fuels, as part of the government’s decision to have 10% electricity generated by renewable energy by 2020.

After calculating the environmental gains of each of the above fuels, the authors of the report concluded that the environmental costs saved by using 1 BCM of natural gas instead of coal and/or HFO amounted to \$220 million. **Therefore, if the Israeli market will consume a minimum of 10 BCM/year of natural gas (see previous note on consumption forecast), the environmental benefits will amount to \$2.2 billion a year.**

Pollutant Emissions by Fuel : gram for 1 KW/h						
	Coal (Before scrubber installation)	Coal (after scrubber installation)	Natural Gas	Diesel Gas Turbine	Diesel Combine d Cycle	Fuel Oil
Sulfur Dioxide (SO₂)	2.4	0.66	0.02	1.1	0.7	2.3
Nitrogen Oxides (NO_x)	2.5	0.66	0.3	2.4	0.9	1.3
Particulates (PM 10)	0.07	0.07	0.01	0.13	0.06a	0.14
Carbon Dioxide (CO₂)	842	842	436	1033	670	743

Natural gas prices in Israel

The whole of 2015 was characterized by a vociferous debate in Israel, revolving basically over ownership of the gas fields, competition, exports and gas pricing. The debate was divided between the gas companies and the government on one side and the opposition political parties, social organizations and some of the media on the other. On the pricing aspect, the latter group argued mostly that the gas price in Israel was too high, that Delek and Noble were a monopoly and had achieved this status by entering into a restrictive trade practice and should be forced to sell down their petroleum rights. We personally believe that most of the aggressive tone that was witnessed throughout the year stemmed from nationalistic resource based fervor based on (1) political motives and (2) a lack of understanding of how gas markets, especially greenfield markets, need to be developed.

The issue of the gas pricing, as well as the other aspects, were eventually resolved by a government decision (government decision #476) approved by the Cabinet in August 2015 and re-endorsed with the new stability clause on 22nd May 2016, by a compromise agreement reached between the gas companies and the government in what has become known as the “gas outline”.

On the pricing front, the outline determined that the country would preserve the sanctity of all gas contracts and prices signed to date, but that future contracts in Israel would be based on four pricing options from which future consumers could select prior to signing their Gas Sales Agreement (GSA):

1. The average price in the market over the preceding quarter before the new GSA is signed;
2. The optimal Brent oil formula given to consumers from the Tamar field;

3. The average gas price achieved by the largest conventional or cogeneration IPPs;
4. Future gas consumers would also be able to adopt the gas pricing formula set in any future gas export contract (including linkage, floor & ceiling price).

In January 2016, the Natural Gas Authority published the 3 optimal prices as follows:

Alternatives:	Price in \$ per MMBTU
Average price over preceding quarter	\$5.34
Conventional electricity producer	\$5.07
Cogeneration electricity producer	\$5.14
No export deals yet signed, so no benchmark price	

An update was published by the Ministry in April 2016:

Alternatives	Price in \$ per MMBTU
Base price as defined in Chapter D of Government Resolution #476	\$5.17

Alternative	Price in \$ per MMBTU
Simple average of prices – conventional power producer	\$4.70
Simple average of prices – cogeneration power producer	\$5.00

Questions and dilemmas

With Israel having more natural gas than it can consume for the next 5-7 decades, the pertinent questions are: (1) whether it should export some of the gas (nobody can predict how long fossil fuels will maintain their prominence) and thus gain economic and geopolitical benefits, (2) convert more of its coal generation to using gas (due to the nefarious effects of its coal consumption), (3) preserve the gas in Israel for future generations (with the risk of stopping all new explorations) and (4) convert its fleet of cars to using gas - CNG, methanol, LNG - (thus minimize the country's need to import oil for transportation).

The difficulty in answering the above dilemmas is exasperated by the fact that: (1) exporting gas to the region is complex because of the volatile relationship between Israel and its neighbours (Palestine, Jordan, Egypt and Turkey); (2) the surplus of gas currently in the global market combined with low prices and (3) the need in a greenfield market to make huge upfront capital investments to develop gas infrastructure, combined of course with the many unknowns and frequent changes expected in the oil and gas sector going forward.

If regional export deals can be achieved however, although it is true that the geopolitical risks would persist throughout the term of the contracts and the transactions themselves could be a future source of political tension, the authors of this document believe that the benefits would far outweigh the risks. One direct and simple benefit that could be achieved by ensuring greater use of gas in the whole region via exports is the fact that gas is an excellent fuel for water desalination, and greater water supplies would contribute to regional stability. Other regional geopolitical benefits include greater regional stability through cooperation, synergies and win-win commercial ties (see more on this issue under the chapter on gas exports).

Gas as a perfect fuel for the short and medium terms

The targets set during the UN climate summit in Paris at the end of 2015, appear to mark the beginning of the end of the fossil fuel era - or at least fossil fuels without carbon capture and storage (CCS). The speed and extent at which this will happen depends on whether the limit in temperature rises would be at the agreed “well below” 2°C from pre-industrial levels by 2100 or at the stated efforts to “try to keep” the increase to just 1.5° C. Although coal is cheap as a fuel for electricity generation, it would certainly be the first casualty. Regarding natural gas the jury is still out.

In the long term, solar and wind energy are more likely to prevail.

However, it is our view that natural gas is a perfect fuel in so many ways and even the major oil companies are transitioning more towards gas at the expense of oil. Natural gas burns absolutely whistle clean, especially the high 99.4% methane content gas available offshore Israel. Gas operated stations have a smaller footprint, require lower investments, minimum maintenance, it enables for dispersed electricity supplies and the development of a competitive electricity sector.

Indeed, in the meantime, until the world achieves its optimal carbon reduction goals, the easiest and cheapest way is to replace coal with gas. This phase in the move towards renewables should not be overstepped as gas is a perfect baseload fuel, especially since many renewable fuels are either still expensive, mostly intermittent and often far from really being green. The IEA predicts gas will experience the highest growth in demand for fossil fuels to 2040.

Gas in transportation

Insofar as bringing natural gas into the transportation sector in Israel, the issues include the need to provide a safety net for the construction of natural gas refueling stations and tax benefits such as reduced excise tax. Although state revenues from taxes on fuel in transportation in Israel total

about \$4.2 billion a year, the upstream petroleum surplus Sheshinski tax paid by the natural gas companies would compensate for the losses of the tax revenue from oil in transportation.

If all of Israel's transportation sector were to be converted to run on a natural gas based fuel this could add another 8 bcm of gas consumption a year, but the likelihood of this happening is minimal.

Exports of gas from Israel

Global fundamentals

Before we embark on a discussion on exports of Israeli gas, we need to first touch on the current global fundamentals of low prices and over-supply. With about an additional 125 mmtpa (million tons per annum) of global LNG capacity coming online by 2020, the situation will only be exasperated.

Thus, the global gas market has currently shifted to a buyers' market, with gas consumers demanding greater flexibility (shorter contracts, the end of destination clauses, hybrid pricing and even seasonal supplies) and, as many buyers became over-contracted, sellers can no longer even rely on the sanctity of GSA contracts (prices are being renegotiated, Take or Pay volumes are being reduced, contract terms are being extended). A majority of deals signed in 2015 were for less than 7 years and with volumes of less than 1 mmtpa, as buyers were reluctant to contract more volumes.

It is estimated that about \$400 billion of investments in oil and gas production have been cancelled or delayed in 2015. In January 2016, Wood Mackenzie explained that "one reason for the growing list of delayed projects is the need for costs to fall more to stimulate investment".

So what will all this mean for potential exports of gas from Israel?

On the negative side, WoodMac's analysis points to the fact that the smallest gains in cost reduction comes from deepwater projects (such as those prevalent in the Eastern Mediterranean), where costs have only fallen by 10%. Thus, despite the size of some of these fields, the combination of "insufficient cost deflation, lower global gas prices and significant upfront capital spend has discouraged companies from greenfield investment in the sector."

On the positive side though, the cyclicity of booms and busts and supply and demand in the oil and gas sectors are known phenomena. What we have witnessed over the last couple of years is the fact that supply is relatively inelastic. Namely, the oil and gas prices can drop to sub-commercial levels and it will still take 4-5 years for supplies to decrease, leading to a glut in the market as nobody wants to reduce their own production and supplies. Demand however is

generally elastic and can react quite rapidly to changing prices. This leads to a cycle of over-supplies, but only for a few years.

It is generally believed that the price bottom has been reached (or nearly so) as new production cannot come on line below an average of \$50-\$60 a barrel for oil or \$10-12 per mmbtu for an LNG project. Eventually the current cuts in investment will reduce future production, boost demand, pointing to tighter markets and eventually higher prices.

Indeed, recovery can be relatively fast depending on the degree of elasticity and inelasticity in the market with the slope of decent and recovery depending on a number of factors. Contrary though to the past, elasticity of supply has changed, with Saudi Arabia no longer playing the role of swing oil producer, whilst the shale oil and gas sector in the US can react far quicker than many former conventional producers. Demand side elasticity for LNG is becoming more difficult to assess due to the emergence of new markets, the greater availability of FSRUs making it easier to put the technology in place to use it.

In addition one needs to take into consideration the conflicting interests and the mixture of reactions by States (e.g. Saudi Arabia vis-à-vis Iran, Russia or the US; Qatar vs. Australia), compared with the commercial interests of oil and gas companies. Other factors include the degree of global decarbonisation, development of renewables, return to nuclear, technological advances in both the supply and demand side, energy conservation and efficiency.

Israeli export policy

In June 2013 the Government of Israel decided that companies would be permitted to export 400 bcm of gas out of the total proven discoveries to date (explicitly the policy sets a quota of 540 bcm to remain for the local market). This decision was re-endorsed with the final passing of the gas outline by the government in December 2015 by enacting Article 52 of the Restrictive Trade Practice Law. This article specifically relates to state security and foreign relations issues, namely it places emphasis on the geopolitical benefits of regional exports of gas from Israel.

The authors believe that such export limitations are superfluous at this stage and in its April 2016 report on Israel, the OECD explicitly said that the government should consider relaxing export restrictions (as one means to encourage further exploration and to attract international companies). More important though at this stage, is for the government to understand what role it needs to play to help further those export options that have a good chance to move ahead and resolve any political impediments in the way.

Export options

Israel's various gas export options are being examined with respect to the technical, logistical commercial and geopolitical aspects of each alternative.

There are a number of options to export Israeli gas, either by pipeline or as LNG, and a number of countries to which this gas can be sold. The nearby onshore pipeline options include lines to Palestine and Jordan, requiring no more than a few dozen kilometres. Offshore pipelines would need to run between 200, 400 or 550 km to reach Cyprus, Egypt and Turkey respectively.

All these potential pipeline projects would be to supply gas to meet local consumption needs in these countries. In Egypt, some of the gas would in addition be exported as LNG from the two currently idle existing LNG facilities onwards to other countries such as to Asia or Europe whilst the Turkish option, could include a second phase of pipeline gas exports onwards to Europe. The LNG options, include as aforementioned, the use of the two existing LNG facilities in Egypt, or the construction of a new LNG plant onshore or offshore Israel or Cyprus.

Israel needs an anchor buyer to be able to develop Leviathan. Such a buyer can be Egypt or Turkey, or a combination of Jordan and increased local demand in Israel if the right policies are put in place locally.

In the event an export deal can be signed with Turkey and/or Egypt then these are the following issues to be considered:

Turkey - Both Turkey and Israel need allies. Indeed, Turkey which had opted for a policy of “zero problems with its neighbors” over a decade ago, as its core foreign policy vision, now finds itself either in open conflict or in tense relations with Syria, the Kurds, Cyprus, Egypt, Iran and last but not least Russia. Relations with Israel which used to be prolific started to sour a decade ago culminating in an outright break with the Marmara affair in 2010. A sudden change started to take place at the end of 2015, which became palpable when at the end of January 2016 President Erdoğan said “that Turkey must accept that it needs Israel and that Israel is in needs of a country like Turkey in the region”.

If a gas deal could be made between Israel and Turkey, this would provide Israel with the added benefit of connecting the country via, what should be constructed as a bi-directional gas pipeline, to Turkey which has the potential of becoming a major transit for gas and could thus in fact enhance Israel’s security of gas supply, if its own resources are depleted before new energy technologies are used.

From the Turkish point of view, whilst the country has several current and future gas suppliers, it has every justification to want to diversify these sources to the optimal extent. This is especially because of its lack of indigenous gas resources, growing demand and the precarious situation it finds itself in due to two suppliers (Russia and Iran) providing more than 70% of Turkey’s gas supplies. In fact, both Russia and Iran have cut off gas supplies to Turkey on certain days over the last few months (Iran in December 2015 and Gazprom in February 2016).

At this stage, Israel and Turkey have been reported to be nearing a reconciliation agreement. It is widely believed that the possibility of a gas transaction between the two countries is one of the motivations for this.

Potentially, one of the main hurdles to achieve a rapprochement between Israel and Turkey that would enable for a gas deal to take place would be strong objections from Russia. Turkey is Russia's second largest gas client and Russia is likely to react strongly against anyone trying to encroach in its territory. Russia's relations with Israel have generally been fairly good. Recently the two countries even reached a tacit understanding on allowing Israel some freedom of movement in Syria.

However, another as yet unresolved political impediment still lurks in the background. Indeed, any gas from Israel to Turkey has to go through Cyprus' EEZ, putting Cyprus in the middle. With the ambiguity of how UNCLOS' Law of the Seas-1982 deals with the ability of third countries to lay pipelines in the EEZ of coastal states, such a deal would require in the very least an agreement by Cyprus (i.e. an agreement between Israel and Cyprus) and probably a solution of the Cyprus problem (i.e. an agreement between Cyprus and Turkey).

Egypt - On the Egyptian front, Israel and Egypt signed a peace agreement which has hold steady since 1979. The agreement though, described more often as a "cold peace" is backed mostly by cooperation on government to government level, such as on issues relating to Sinai, Gaza, security, water and other aspect. If a gas deal could be sealed between the two countries, this would go a long way to strengthen both the inter-state ties and establish important economic relations which would thus trickle down to the people of both countries.

All the gas export options have been discussed at length over the last couple of years. Below are a few more bullet points regarding each option:

Palestine

Potential to export about 0.5 bcm of gas a year to the existing 140 MW power station in Gaza and for future power stations to be constructed in the West Bank.

Jordan

The country imports about 97% of its energy needs. There is a potential for Israel to export about 3 bcm a year to Jordan to both the Dead Sea region factories and/or to NEPCO, the Jordanian State National Electric Power Company.

This would need to compete against current LNG supplies that Jordan has been buying from Shell via an FSRU installed since mid-2015. This project has the strong support of the US administration.

Egypt

Demand for gas in Egypt is growing fast whilst developed fields are depleting. Thus, despite the August 2015 discovery of the 30 tcf GIP ENI Zohr field (producible volumes unknown as of the time of writing this document) and other ongoing developments by BP, Shell, Apache and others, Wood Mackenzie estimated in January 2016 that by 2023 demand for gas in Egypt would outweigh local supplies. In addition, Egypt has 12.2 mmtpa of unmet LNG export facility looking for feedstock.

Some of the main problems with exports to Egypt include Egypt's outstanding arrears to foreign oil companies stated to amount to over \$5 billion as of mid-2016, unknown factors regarding Shell's new ownership of BG's LNG export facilities, competing imports of LNG into Egypt via 2 FSRUs combined with the potential for further discoveries, relatively low gas prices (ranging currently from about \$4-\$5.88 per mmbtu) and high Government Take (GT) in Egypt on Egyptian gas (as per the Production Share Contracts – PSCs). Another unresolved issue as of the date of writing this report, is the International Chamber of Commerce ruling that Egypt must pay Israel's state power utility IEC some \$1.73 billion in damages for halting gas flows in 2012, and the 'conflict' this is causing.

Turkey

Israel could potentially supply 10 bcm a year from Leviathan to the Turkish market. Turkey has the largest economy in the Eastern Mediterranean region with negligible volumes of indigenous gas (0.5 bcm produced in 2014) and has historically paid high gas prices for its imports from Russian and Iran and a sense that many of its sources of supply come from unstable countries. Thus Turkey, with local consumption in 2015 of about 48 bcm is looking for diversification and lower gas prices.

Turkey is looking at all its options including greater imports from Azerbaijan and from Iran as well as potentially new supplies from Kurdistan or Turkmenistan, and larger volumes of LNG.

Despite the tension between Israel and Turkey over the last few years, selling gas to Turkey has once again become a real option with progress on the reunification in Cyprus and with the start of a thawing of relations between Israel and Turkey towards the end of 2015. On the geopolitical front, the implications here are the risks of angering the Russians which supplies 55-60% of Turkey's gas demand, whilst the Americans would be highly supportive of such a transaction.

How to develop the Israeli gas discoveries and promote the Israeli gas market

Consumption of natural gas in the local market

The best scenario for ensuring that the gas fields can be imminently developed and the one which falls both within the realm of responsibility and is within the power of the Government of Israel to achieve, is to increase the consumption of gas in the Israeli market: by replacing coal generation in the electricity sector with gas, by converting industries and energy consumers to using natural gas and by bringing gas to the transportation sector.

Indeed, keeping gas in the ground hoping that it can be used for many generations to come is probably not the best solution. One of the main reasons for this is that technological advances are moving ahead on a par with environmental requirements. Prices of alternative energy sources, such as solar panels, are quickly falling, with solar panels having plunged to barely over \$0.5 per watt on average from over \$3 in 2008. And they are continuing to fall with some even forecasting that renewables will represent anything up to over 70% of global energy production within a generation.

The authors of this report believe that the greatest benefits of gas to the country do not come from the revenues that are channeled to the Treasury, but from the consumption of gas in the local market.

Indeed, the money saved on not having to import oil or coal for electricity generation, on the financial environmental/health impacts of using gas compared to oil and coal, on being able to establish medium and small sized efficient gas powered power stations (CCGTs) located explicitly where electricity demand is required, the much greater efficiency of gas compared to coal, of being able to introduce competition in the electricity sector, and other benefits such as the power that comes from independence, are vastly greater than any financial benefits that will be derived from taxes on the sale of the gas.

Thus, the **best way to increase consumption of gas in Israel is to reduce the use of coal.**

In order to be able to do this while providing high security of supply:

- At least two natural gas fields need to be developed and preferably even three, to be connected to the INGL natural gas transmission system.
- The State needs to incentivize the construction of new efficient gas operated power stations (CCGTs), either by IEC or by the private sector, namely by independent power producers (IPPs). Another (less efficient) option would be to convert IEC's coal generation units to be able to use natural gas. Converting the old coal stations would mean that these would be

much less efficient than new CCGTs, but on the other hand, it would preserve the power generation capacity within the hands of a state utility.

With the right incentives and policies, the gas consumption in the power sector can increase by up to 6 bcm a year to reach a total of 16-18 BCM/y of local market consumption within 5-7 years. Such greater volumes of consumption would facilitate the development of Leviathan, Tanin and Karish and enhance the exploration of new fields.

Over the last two years, the Public Utility Authority-Electricity (PUA), which is the electricity regulator, has placed impediments in the way of constructing new power stations. On the one hand, IEC is not granted licenses to build new power stations and on the other hands IPPs are not given a stable environment to establish themselves (the PUA for example kept on delaying providing the electricity tariff at which they can sell their electricity, and only guarantees a natural gas price of up to \$4 an mmbtu). The problem has been exacerbated by the fact that since January 1 2016, there is no longer a PUA and no organized entity has properly taken over yet (with the new chairman of the Electricity Authority within the Ministry of Energy only having been appointed at the end of May 2016) and no stated policies have been put in place.

In addition, another way to increase consumption of gas is through greater industrial and commercial consumption and moving ahead to convert the transportation sector to using gas.

The industrial sector should be encouraged to grow from what it is today at about 2 bcm a year to another 1-1.5 bcm a year by 2020 (including the ammonia plant to be constructed).

Gas in transportation is currently only expected to amount to 0.2 bcm a year by 2020 and 2 bcm a year by 2030, but this volume can be substantially increased. If most of Israel's transportation sector were to run on gas – not a feasible goal – then this would amount under 2016 terms to 8 bcm of gas a year. Comprehensive policies and incentives need to be put in place to increase consumption in this sector as much as possible.

In order to achieve the above, it is also necessary to further develop the natural gas transmission and distribution systems (see below).

Israel Natural Gas Lines (INGL)

Increase the system's capacity to transmit gas in INGL's high pressure natural gas transmission network.

INGL, which is a state owned monopoly, has limited capacity to transmit gas, which creates a bottleneck for consumption, mainly during peak hours and in emergency times. For example, the capacity in the south of the country, from the Soreq gas station down to the Dead Sea is limited and construction is not moving ahead.

The regulator, namely the Natural Gas Authority in the Ministry of Energy, lacks a quorum of directors and thus has been legally prevented from making any decisions for nearly 2 years.

This intensifies the problems mentioned above of the complexity of building new natural gas power stations to replace the old inefficient coal ones, as without assured gas supplies being transmitted to the point of use, no additional gas generated power stations can be constructed.

Distribution Networks

The country has been divided into 6 gas distribution areas for the construction of low pressure gas distribution by the private sector (via public tenders), in order to link up industrial and commercial gas consumers.

The problem in this area can be described as a vicious circle: namely, currently the cost to convert a factory to connect up to the natural gas network and to convert the facilities to be able to consume gas cost millions of shekels in capex (depending on the size of the consumer).

Potential gas consumers also need to pay very high fees for connecting (600,000 shekels) and for using the infrastructure to transmit the gas (\$1-2/mmbtu) as well as additional high operational fines/fees (\$0.5-1.5/mmbtu) depending on their swing/consumption profile. Potential gas consumers could supposedly have been able to bear these expenses in a very high alternative energy cost scenario (with oil at \$100 /BBL) but, in the past year the lower oil/HFO prices have eliminated the economic logic for such investment.

At the same time, the distribution license holders are unable to construct fully integrated and comprehensive networks due to the lack of paying consumers in their respective areas, leading to higher pro-rata costs to those consumers that are able and/or interested to connect.

Thus, most of this downstream sector has become deadlocked. This whole sector needs to be fully revised to understand if certain investment guarantees or other means of support can be provided to help develop the infrastructure (either on the side of the pipeline and/or of the consumers, with some progress having just been initiated in April 2016 with the Ministry of Energy providing higher grants for facilities that decide to convert over to consuming natural gas as long as the price of oil is below \$60 a barrel).

Marginal fields' incentives

Because of the lack of a ready market for Israeli gas and the higher unit costs of developing marginal gas fields, it is very likely that under the current conditions (market availability, existing infrastructure, gas prices, fiscal policies) that most if not all small fields will remain

undeveloped. This also impedes further exploration since until a properly laid policy has been put in place, entities will be loath to undertake exploration activities.

Some of the basic ingredients needed to promote the above include:

- Putting together a clear definition of marginal fields
- Purchase commitment for all the gas produced from marginal fields
- Tax or gas price incentives
- The ability for producers to pay the regressive royalties (which are revenue and not profit based) in kind (namely in gas) rather than in cash (this ability exists in the Petroleum Law, but has never been implemented)
- Some form of joint infrastructure with third party access (either state built or the use of existing infrastructure). The owner of the facility will charge a use tariff, based on accepted infrastructure return on investment.

Time table for development

Under the current global, regional and local circumstances opportunities will come and go for the development of each specific field, including Leviathan, Tanin and Karish. What is most important is not to impose artificial timetables (as is imposed by the lease and the outline) that may force companies to carry out investment and development options that are less than optimal for all concerned.

Imposing a strict arbitrary timetable for development could cause the gas companies to move ahead with a less than optimal development plan at a less than optimal time. Thus, although it is indeed imperative that the companies not be allowed to sit on a permit or a discovery without moving ahead if sensible options are available, it is nevertheless just as important to ensure that optimal options are promoted rather than timely ones, and/or that incentives are provided (such as tax incentives) if the need to move ahead is imperative and pressing.

Conclusion

The main points are thus:

1. Increase the consumption of natural gas in the Israeli market: mainly by replacing coal generation in the electricity sector with gas. 10.9 million tons of coal can be reduced in power generation which could be replaced by an additional consumption of 6 bcm of gas a year. New and efficient CCGTs should be constructed to enable to reduce the use of coal.
2. Expand the natural gas transmission system to enhance flexibility of supply.
3. Encourage the construction of a comprehensive gas distribution network and ensure the connection and conversion to gas of 400 more factories by 2020. Seriously consider bringing gas into the transportation sector.
4. Provide “infant industry” incentives to develop marginal fields, and construct joint infrastructure to enable to hook up these fields to the network.
5. The government should consider relaxing export restrictions and help remove all other export impediments, whilst focusing on those export options that can be imminently achieved.
6. Ensure optimal development schedule without imposing artificial time restrictions not anchored in reality but only in law and/or incentivize development if the need for further supplies is indeed pressing.

Whilst the Tamar field is expected to be depleted by 2032, meaning that by this date Leviathan will be able to supply all the clients seeking to renew their gas contract in Israel, the ambition of both the gas companies and the government is to be able to export some gas from Tamar within the next couple of years (to the Jordanian Dead Sea area and possibly to one of the LNG facilities in Egypt), and greater volumes from Leviathan as of 2019-2020.

Indeed, on this front, there is no conflict between the gas companies or the States’ economic and geopolitical interests.

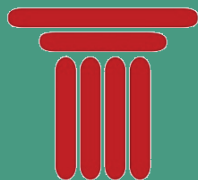
Leaders from Israel, Cyprus, Turkey and Egypt have at times expressed their faith that the newly found hydrocarbon resources in the Eastern Mediterranean will act as a source of peace and cooperation, rather than conflict, competition and tension, and that gas can help to both improve or amend the relationship between all the countries of the region and even build a bridge between this part of the Med and Europe. This would require cooperation and synergies and potential joint development options.

However, beyond the need for gas in each country, there is another element at play, namely competing aspirations by many of the countries in the Eastern Med to become an “energy hub”, or at very least the transit country from which gas would flow to Europe. Cyprus, Turkey and Egypt have all been vying for this role at different times, with commercial and political

ambitions to position their respective country at the heart of energy highways linking the Caspian region, the Middle East and the Levant to European markets. The balance of interests, synergies and conflicts thus shifts at times between basic needs of security of energy in these countries to greater political ambitions of becoming an energy corridor.

However, at the end of the day, one of the greatest economic challenges facing countries such as Egypt, Jordan and Turkey is the availability of energy and even for the tiny island of Cyprus with some of the highest electricity prices in Europe, the need for gas is of paramount importance. For Israel, which is an energy island having its own natural gas resources has been a tremendous boost. Diversity and reliability of energy supplies have become paramount for most of these countries.

Going forwards it is of paramount importance that Israel both maximizes domestic demand for gas whilst seeking export options that achieve the greatest political benefit with near neighbors.



Samuel Neaman Institute

For National Policy Research

Technion - Israel Institute of Technology

Tel : 04-8292329, Fax : 04-8231889

Technion city, Haifa 32000, Israel

www.neaman.org.il