The Natural Gas Revolution in Israel

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Israel is in the second decade of a natural gas revolution, thanks to natural gas found in large quantities in Israel's economic waters in the Mediterranean Sea. The use of natural gas is an important contribution to environmental quality and brings with it significant economic advantages. At the same time, the gas revolution brings with it several complex dilemmas, for example, how to divide the benefits from the gas reserves between this generation and the next; this division relates to the amount of local consumption and gas export in the current generation and the balance left for the next generation. The gas discoveries have strengthened Israel's energy security, but have presented a new security challenge, namely, the defense of vital gas installations located far offshore. In the realm of foreign affairs, gas export may make a political contribution, but gas is the source of strife with Lebanon over control of economic waters, and a similar conflict might arise with other neighbors.

The Natural Gas Revolution

The Israeli natural gas revolution developed in three waves. The first wave began in 1999-2000 with the discovery of natural gas in commercial quantities in the gas fields Noa and Mari B opposite the Ashkelon coast (the "Tethys Sea" reserves). Regular gas delivery began in 2004, and in recent years those reserves have been depleted. The second wave began in 2009 with discovery of gas in the first drilling in the Tamar field, in the sea opposite Haifa. The gas flow from this field began in 2013. The Tamar field enabled the continued supply of Israeli gas to the economy, and will continue to be

a central supplier for the economy's needs in the coming years. The third wave began in 2010 with discovery of gas in drillings in the Leviathan, Tanin, Shimshon, and Qarish fields, among others. With these discoveries Israel became a potential gas exporter. For export, suitable infrastructure must be constructed – pipelines or gas liquefaction installations.

According to the assessment carried out by the Inter-Ministerial Committee to Examine the Government's Policy Regarding Natural Gas in Israel (known as the Zemach Committee) in 2012,[1] the quantity of gas in Israel's economic waters that can be extracted at varying levels of certainty stands at 1,480 billion cubic meter (BCM). This figure includes:

a. Reserves: fields at the highest level of production certainty. Natural gas reserves in these fields are classified by three levels: Confirmed (P1), Expected (P2), and Prospective (P3); reserves in Israel are found mainly in the Tamar field, and are estimated at 280 BCM at level P2.
b. Contingent resources: fields with a lower probability of production, which is contingent on various conditions, including technical and economic feasibility and an accepted development plan. Here too there are three levels: low estimate of quantities (C1), best estimate (C2), and high estimate (C3). The Zemach Committee characterized holdings such as Leviathan, Dalit, and Tanin as contingent resources. According to the committee's estimate, these resources include 520 BCM at level C2. In other words, the total of reserves and contingent resources reaches approximately 800 BCM.
c. Prospective resources: fields with the lowest production prospects, most of which are in a pre-drilling stage, and thus offer estimates alone. The total quantity of extractable gas in these fields is estimated at 680 BCM. The quantity of reserves and contingent resources in these fields can be updated based on future drillings.

The natural gas revolution was made possible thanks to large investments from the Israeli business sector, institutional investors, and foreign investors who purchased units of partnership. Another factor was the development of relatively advanced technologies that enable deep water drilling. Drilling of Tamar 1, for example, was carried out at a depth of 4.5 thousand meters below sea level.

Following the gas discoveries, the Knesset passed the Natural Gas Sector Law 2002, and over the years, developments and experience prompted amendments to the stipulated regulations. At the same time, main natural gas delivery lines were laid in the country. The government-owned corporation Israel Natural Gas Lines (INGL) was licensed to construct and operate the delivery system, but is not permitted to be involved in other portions of the industry. The delivery rate is uniform for all consumers, and the consumer bears the cost of connection to the delivery system. Until now, gas has mainly replaced coal, oil, and diesel at power stations and industrial plants, including: Israel Chemicals, Dead Sea Works, Nesher Cement Enterprises, Bazan Oil Refineries, Haifa Chemicals, America Israel Paper Works, and Delek Desalination. In 2011, power stations accounted for 82 percent of total gas consumption in Israel, and industry consumed 18 percent.[2] There are also future plans to use natural gas for transportation and as a replacement for cooking gas. Table 1 charts the growth of natural gas supply in Israel over the past decade.

Table 1: Natural Gas Supply in Israel

Year	BCM
2004	1.2
2005	1.6
2006	2.3
2007	2.7
2008	3.8
2009	4.2
2010	5.3
2011	5.0
2012	2.6
2013 (forecast)	7.8
2014 (forecast)	8.6

Source: Natural Gas Authority presentation, May 2013

In addition to the natural gas discoveries, efforts are underway to discover and extract oil on Israeli land and in Israeli waters. Oil was the original and preferred target of Israeli energy prospectors, but until now

they have found only gas. The chances of oil discoveries of large quantities in Israel are estimated to be higher than in the past, due in part to improved drilling technologies and large investments in the sector. A discovery of large oil reserves in Israel could lead to a major step forward in Israel's energy economy and to full Israeli energy dependence for a prolonged period, but the oil sector is beyond the scope of this article.

The Advantages of Natural Gas

Environmental quality and health: Natural gas is created by bacteria from organic material, and is composed nearly entirely of methane. The source of a significant portion of organic material in the region is ancient sediment from the Nile River washed into the Mediterranean Sea. Natural gas burns relatively cleanly in comparison with other fuels such as oil, diesel, and coal, and it emits fewer pollutant gases and greenhouse gases. Power stations that operate on gas can be constructed anywhere, as opposed to coal power stations, which must be constructed on the coast – an already crowded area that is expensive and vital for tourism and recreation.

Economic advantages: Natural gas is the least expensive energy product in the Israeli economy. According to the Natural Gas Authority (in May 2013), the price of diesel per energy unit is 3.5 times higher than that of natural gas, the price of oil is 2.25 times higher, and the price of liquefied petroleum gas is three times higher. The use of natural gas in 2004-2012 saved the economy 22 billion shekels – 17 billion in electricity production costs, and 5 billion in savings in industry.[3] In addition, a power station operated by gas is substantially less expensive to build than a coal power station, and requires a smaller area. The contribution of the gas sector to the Israeli GDP growth, estimated by the OECD, will be 1 percent in 2013 and 0.7 percent in 2014.

Natural gas also supplies direct income to the state treasury as a result of royalties and taxes (corporate tax) paid by gas suppliers. In 2010 Finance Minister Yuval Steinitz established the Committee to Examine the Policy on Oil and Gas Resources in Israel (known as the Sheshinsky Committee). The committee examined how to distribute the profits of natural gas among the state and suppliers, with the state's share determined by fees, taxation, and royalties on oil and natural gas. In the end, after examining

the arrangements in other countries, the committee recommended raising the state's share of oil and gas production profits by a significant amount. The committee's recommendations were anchored in the Petroleum Profits Taxation Law, 2011. Finally, production of Israeli gas contributes to the reinforcement of the energy sector in Israel, affording employment, research and development infrastructure, academic tracks, and so on.

Reduction of Israel's dependence on foreign energy: Over the next decade, natural gas will become Israel's main source of energy, and the overall increase in the demand for energy for electricity production, industry, and to a certain extent transportation,[4] will be supplied by natural gas. According to the Natural Gas Authority, the natural gas systems must be treated as critical economic infrastructures, with care taken to provide backup and redundancies. In other words, the country cannot be satisfied with matching supply to demand, but must make sure there exists surplus supply and diversification, both with respect to suppliers and with respect to supply systems for the economy.

While important for many countries in the world, the reduction of energy dependency is particularly beneficial for the State of Israel, as it is still isolated in the Middle East, and the supply lanes to it are narrow and limited. Israel also may risk energy shortages due to events in the world like instability that may affect large oil producers such as Saudi Arabia. Along with other countries, Israel suffered from the oil shortage following the Iranian revolution, which led to soaring prices and supply problems throughout the world.

The main lesson learned regarding the development of gas systems and independence of external suppliers can be seen in the series of risks that were realized in the case of gas imports from Egypt following the start of the turmoil in January 2011. In February 2001 the Israel Electric Company decided to to purchase 1.7 billion cubic meters a year for 10-15 years until the total cessation of gas supply from Egypt. However, the ensuing situation illustrated that Israel relied on an unstable source, and all potential risks were realized, including: security risk – the failure of Egypt to protect the pipeline from terror; economic risk – irregularity of supply and Egyptian unwillingness to stand by the contract price; and geopolitical risk, represented by the lack of internal stability and the opposition among

various groups in Egypt to the sale of gas to Israel. The political benefits that Israel expected from the purchase of Egyptian gas were never realized; Egypt did not see export to Israel as a significant asset (except those Egyptians closely associated with the export business who benefited from the deal),[5] and sometimes viewed it as a political liability.

In contrast, the decision to purchase Israeli gas has proven itself, despite the doubts in Israel in the early 2000s regarding the quantity of gas along Israel's coast. The use of Israeli gas provided incentive for gas prospectors to search for and develop new fields within Israel's territorial waters. Without this utilization of Israeli gas, it is quite doubtful whether they would have discovered the Tamar and Leviathan fields.

Limitations of Natural Gas

Transport and storage: In contrast to oil and coal, it is difficult to store and transport natural gas in containers. The most effective way to market gas is through the laying of a gas pipeline infrastructure. This demands a major investment, which grows in proportion to the distance to the consumer. In the absence of a suitable infrastructure, the gas must be liquefied and transported in special tankers, which entails relatively high costs. The decision to use exhausted gas reservoirs to store gas from other fields is a correct strategic decision.

Security: In contrast to the vulnerable pipeline from Egypt, and to coal and oil supplied by ship from great distances, the Israeli gas is supplied through short and safe lines to the economy. Nevertheless, gas installations represent a new challenge in the field of defense of vital installations far offshore.

The "Dutch Disease": The use of Israeli gas may indeed save billions of dollars in foreign currency expenses in the ongoing balance of payments and replace the need to purchase dollars for importing oil, and thus in the future foreign currency income will be increased due to gas export. However, Israel currently suffers from the opposite problem – a surplus of foreign currency in the local market which causes an appreciation of the shekel, thanks to the impressive level of export of the technology industries and to American aid. Loans taken by the Israel Electric Company abroad converted to shekels in the local market also increase the supply of foreign

currency. The impact of the shekel's appreciation is a blow to production in the economy: the exporters receive less shekel revenue while their expenses are not reduced, and the manufacturers who supply the local market have problems dealing with lower prices on imports. As a result, the manufacturers' profits will drop, the quantity of workers dropped by industry will increase, and tax revenues will drop. In order to deal with this problem, the Bank of Israel decided on a policy of proactive purchasing of foreign currency in the local market, $3.5 billion in 2014, with the objective of offsetting the foreign currency impact stemming from the gas discoveries. It was also decided to set up a foreign investment fund where some of the state's foreign currency profits can accrue.

Gas supply monopoly: Following the fall of the Egyptian supply channel, the Israeli economy is dependent on the Israeli gas suppliers, led by the owners of the Tamar and Leviathan fields. Subsequently, Antitrust Authority head David Gilo declared the Tamar gas field a monopoly as of the middle of 2013. Gilo's announcement said, "This means that the prohibitions and provisions applying to monopolies by law apply also to every partner in Tamar in its activities in other gas fields such as Leviathan or Shimshon."[6] As a rule, Israel's antitrust law forbids a monopoly or its owners from abusing its position in a manner that might reduce competition or harm the public, for example through exaggerated pricing, predatory pricing, and discrimination among customers.

Gas Export and the Intergenerational Dilemma

Gas export must address the issue of the revenues of gas prospectors, whose interest is to export the maximum amount of gas as quickly as possible in order to see the return on their large investments and produce maximum profit in time frames that are considered standard in the business world. In light of the existing discoveries, it is clear that if gas export is not permitted on a large scale, there will be no reason for further investment in the search for and development of new fields that cannot yield sizable profits in the foreseeable future.

A second and far more complex issue relates to the distribution of the benefits of gas (income, cheap energy, clean air, and energy security) between this generation and the next (the residents of Israel in another

25-35 years). Gas benefits can be distributed as follows: keep all the gas in the sea floor for local consumption only, so that future generations can use it for their needs; or use the gas to provide for all current local needs and export the remainder until the fields are exhausted. The income the state receives from gas exports will then be invested in a fund or in projects that will benefit future generations. In other words, even the second approach does not ignore the next generation. From an economic perspective, the dilemma is contingent on two main variables that work in opposite directions. One variable is the price of gas in the future – the more gas prices, based on forecasts, are expected to rise in the future, the better it is to leave gas in the ground. The second variable is the return on capital accruing from sale of gas in the present – the higher the projected return, based on forecasts, the more desirable it is to export the gas and invest the profits in a fund or other projects, whose cumulative contribution to the economy will be larger.

These two issues were at the core of the debate in the Zemach Committee, which presented its recommendations in August 2012. Regarding export, the committee determined that "consumers in the Israeli economy should have precedence for the purchase of natural gas from the fields under Israeli control." In order to ensure this, the committee decided that "fields will be obligated to supply a certain quantity of natural gas to the local economy; every producing field will be required to be connected to the local economy at a time and scale to be determined." The committee further recommended that "specific terms shall be set for fields under joint control of Israel and its neighbors in the framework of individual arrangements." Also regarding export, the committee decided that "owners of holdings will be required to receive advance approval for the sale of gas not intended for the Israeli economy; acquisition of an export license will be mandatory; the quantity of gas permitted for export from each field shall be determined in terms of maximum daily production permitted for export, as per the license (two restrictions shall apply to owners of holdings: a restriction on daily production, and a restriction on total quantity of export)." Moreover, the committee recommended that export of Israeli natural gas be permitted "only from an export installation (ocean-based or land-based) and territory under Israeli control," and that

"an inter-ministerial committee headed by the director general of the Prime Minister's Office shall examine ways of removing obstacles in the natural gas industry, and of promoting the capability of export within short time frames." In addition, it was recommended that "the Foreign Ministry should act for the promotion of an array of diplomatic intergovernmental agreements for future cooperation in the natural gas industry."[7]

Regarding the intergenerational dilemma, the Zemach Committee concluded that while the total of potential reserves might reach 1480 BCM, some reserves are estimated at an insufficient probability, and therefore only 950 BCM would be used as an estimate for policy recommendations (table 2). The committee recommended that in five years another assessment should be made to update the export quota in light of discoveries and development of fields.

Table 2: Zemach Committee Estimate of Potential Reserves for Policy Formulation

Natural Gas Reserves	BCM
Estimation of quantity of gas considered available at a high probability (reserves and contingent resources) in fields that have been drilled.	800
Additional resources that are highly likely to be discovered (over 90 percent) out of 80 BCM classified as prospective resources, pre-drilling, at varying probabilities of realization.	150
Total reserves for policy recommendations	950

Source: Zemach Committee Report, August 2012

The Zemach Committee concluded that the total quantity of gas in the Mediterranean Sea should be extracted and divided between local use and export over the next 25 years, such that local gas demand will be met by a total of 500 BCM, and the rest – 450 BCM – will be directed to export (table 3). The arguments for this time frame were as follows: "A conservative quantitative estimate points to a time frame of between 15-20 years as economically reasonable for preferring to keep natural gas for future local supply over export."[8] This time frame is in line with common practice in the world of energy regarding standard time frames as far as entry into investments from the point the decision is taken. The supply

will be in accordance with the requirements of the Israeli economy and the development of demand in the local market, including the meeting of maximum hourly demand required for this economy (especially at peak demand). "The assurance of local supply for a period of time significantly longer than 25 years is expected to lead to harming the profitability of the search for and development of fields. In addition, employing a long term economic view, it will not be profitable, among other reasons, due to significant loss of direct income to the state."[9]

Table 3: Demand Scenario for Natural Gas in Israel

Year	BCM
2015	9.7
2020	13.3
2025	16.6
2030	20.6
2035	23.4
2040	27.1

Source: Zemach Committee Report, August 2012

According to the scenario of the Zemach Committee, from a total of 501 BCM that will serve the economy between the years 2013-2040, 336 BCM will be used for electricity production, 111 BCM will be used for industry, 40 BCM for transportation, and 14 BCM will be used for methanol production.

Various objections to the Zemach Committee conclusions arose, especially regarding the considerations and method of calculation by which the Zemach Committee chose to present the scale of export. It was claimed that the committee did not take into account all of the benefits of local gas use to the economy, and that it based itself on lower-than-expected demand forecasts, among other reasons because it did not relate appropriately to the expected demand of the transportation[10] and industry[11] sectors. Some argued that the committee's estimates are inflated because they relate to reports of potential supply and not proven reserves, and that the supply did not take into account extreme scenarios of technical failures and the collapse of wells. It was also argued that the formulas used produce results

that can be adjusted by changing the discount interest rate. Opponents have called not to export gas, or to significantly increase the amount of gas to be kept for the economy's needs, e.g., up to 600 BCM.[12]

On June 23, 2013, the government decided to a large degree to endorse the calls to increase the quantity of gas to be used for the local economy and to reduce the export quota (table 4). It decided that Israel will keep approximately 540 BCM (57 percent) of its potential gas reserves for local use, in other words an addition of 90 BCM over the recommendations of the Zemach Committee, or an additional 3 to 4 years of consumption for the Israeli economy (in terms of the demand forecast for 2040). According to both approaches, the era of Israeli gas is expected to end in less than 30 years, meaning in a generation's time. Furthermore, the government decided to obligate the Tamar partnership to connect the field to the Ashkelon coast through an additional pipeline by the end of 2016, and to install compressors in the existing pipeline to Ashdod in order to increase its capacity. The government also decided that export of gas to Jordan and the Palestinian Authority should be subtracted from the export quota. The government permitted the export of 20 BCM from the Tamar field immediately, even before the Leviathan field is connected to the coast.

In the wake of the government decision, a number of Knesset members opposed to the export of gas petitioned the Supreme Court to transfer the decision on the matter to the Knesset. In late October 2013, the Supreme Court rejected the petitions and maintained the government decisions, first and foremost the proportion between local use and export of 60:40.

Table 4: Gas Export Decided by the Government of Israel (compared to Zemach Committee Recommendations)

	Government Decision June 2013		Zemach Committee Recommendations August 2012	
	BCM	%	BCM	%
Quantity for use in Israeli economy	540	56.8%	450	47.4%
Balance for export	410	43.2%	500	52.6%
Total potential reserves for setting of policy	950	100%	950	100%

Beyond the legal significance regarding the relationship between the executive branch and the legislative branch, the decision will expedite the organization of the company's ownership rights to the Leviathan field in preparation for gas production, with the hope that it will begin in 2018. Reduction of the dimension of uncertainty regarding Israel's conduct on the issue of export is likely to appeal to potential external investors such as the Australian company Woodside. The decision is also likely to ease progress in contacts with potential local consumers such as Jordan, Egypt, and the Palestinians. The issue of natural gas represents a central factor in the plan designed by US Secretary of State John Kerry for the improvement of the Palestinian economy. The swap agreement between Israel and the Palestinians (the purchase of gas from the field opposite Gaza in return for the sale of Israeli gas to PA territories in the West Bank) may hold significance in any future diplomatic agreement.

The question of gas export to Turkey, both as a consumer and as a distribution channel, is a sensitive diplomatic issue. The tension between Israel and Turkey has still not dissipated despite Prime Minister Netanyahu's apology to the Turkish Prime Minister in the presence of the US President. Both Israel's government and the private sector, including Israeli and foreign companies, will need to find solid guarantees prior to turning to Turkey regarding gas exports.

The potential partnership with Greece and Cyprus on infrastructure and transport is important mainly because they are members of the EU who also are a presence in the eastern Mediterranean Sea. Other potential export markets such as India and China hold diplomatic significance, but it is relatively small in light of the tremendous energy consumption of these countries and the fact that the quantities of Israeli export would be the smallest in the world gas industry.

Besides keeping reserves in the ground, another tool to solve the intergenerational dilemma is the establishment of a fund that will accrue profits for future generations. Such a fund is to be set up by the Bank of Israel, which will manage it through an investment committee. According to plans, it will invest its assets abroad, mainly in stocks, starting in 2017. The assessment is that by 2040 the fund may accrue assets totaling 300 billion shekels. Current profits from the fund, such as interest, will be used

for the state budget. The investment abroad will ensure that the fund is removed from the risks of the Israeli economy and that the principal can be tapped only in emergency situations. Another consideration in favor of foreign investment is to help avoid the "Dutch Disease." Opponents of the fund abroad argue that already today Israel suffers from severe problems, and thus it is better to leave the money in Israel and invest it in funds that specialize in the advancement of critical long term infrastructures, education, closure of socioeconomic gaps, and so on.[31]

Conclusion

Although Israeli natural gas is a strategic and economic asset of great importance, its percentage of Israel's GDP is expected to be small, and it does not lend Israel significant status in the global energy industry. That said, the export of the gas is necessary, whether for the financing and development of existing gas fields, for future gas and oil prospecting (not yet discovered in the sea), or to signal to Israeli and foreign investors that their investment in Israel is generally worthwhile.

According to the government decision regarding the scale of gas exports and the assumptions of the Zemach Committee (potential reserves for policy formulation and future local consumption), the gas will be sufficient for at most 30 years of local consumption. In other words, based on these assumptions, the age of Israeli gas production will end by 2045, when the economy's dependence on natural gas will be on a scale of 30 BCM per year of consumption. Theoretically, if annual consumption is restricted to this quantity and there is no gas export at all, then the gas fields will last another 15 years, until 2060. One way or the other, Israel will need to supply its energy needs in the future through gas imports or through other energy sources that will be found or developed by then.

The intergenerational dilemma is indeed prominent in the issue of natural gas, but it is only a small issue in the broader context of similar dilemmas. For example, the dilemma also exists regarding the national debt, i.e., how much debt is this generation bequeathing to future generations; the issue of pension payments, in other words, what scale of social burden will this generation present when it grows old; and so forth. Therefore, the discussion of this dilemma must occur in a broader context, and not

focus solely on the natural gas industry, as this generation will bequeath to future generations related elements, namely, real estate, infrastructure, environmental quality, and so on.

The gas industry is rich in advantages, but also suffers from more than a few risks, which must be managed through redundancies of delivery and transport infrastructure, the continued existence of dual systems for alternate fuels at power stations, development of a storage reservoir, and defense of the various installations from physical and cyber attacks.

The natural gas industry is only part of the Israeli energy market, and thus the establishment of a national energy authority should be considered. Such an authority would be responsible for the implementation of a comprehensive national policy for use of the various sources of energy, electricity production, development and use of renewable energy sources, and so on.

The anticipated export of gas to Jordan, the Palestinian Authority, countries in Europe (directly, or through Cyprus and Turkey), and other countries in the world holds considerable diplomatic value, but it should not be expected that it will impact fundamentally on the foreign relations of the consumers with Israel. On the other hand, Israel will need to be especially sensitive to European consumers, who have alternate gas import options.

The disputes with Lebanon regarding sovereign territory and territorial waters are a fundamental point of friction that may lead to military conflicts. Nevertheless, proper management of the dispute can lead to cooperation in the area of production from potential joint gas fields, to joint transport of extracted gas, thus turning the risk into an opportunity.

Notes

1 Report of the Committee to Examine the Government's Policy Regarding Natural Gas in Israel ("Zemach Committee"), August 2012. An Executive Summary of the report, including a map, is available in English at http://energy.gov.il/English/Subjects/Natural%20Gas/Documents/pa3161ed-B-REV%20main%20recommendations%20Tzemach%20report.pdf. An additional map is available in the full report at energy.gov.il/Subjects/NG/Documents/NGReportSep12.pdf, p. 39.

2 Natural Gas Authority presentation, May 2013.

3 Energy and Water Ministry, Natural Gas Authority, presentation of May 2013. For purposes of the calculation the following assumptions were made: investment of approximately 3 billion shekels in conversion of power stations to gas; and in a situation without natural gas, there would be a need to build two additional coal power stations, Station D in 2009, and Station E in 2012.

4 The transportation sector consumes approximately half of the refined oil products in Israel, approximately 20 percent of national energy consumption. Presentation of the Transportation Ministry, Idan Aboudi, "Petroleum Alternatives for Transportation – Multi-Fuel Vehicles," Ministry of Energy and Water website.

5 Dudu Lefkin, "All of Maiman's Men," *Maariv NRG*, February 6, 2001, http://www.nrg.co.il/online/archive/ART/113/077.html/.

6 Amiram Barkat, "Antitrust Head Declares Tamar a Monopoly," *Globes*, November 13, 2012.

7 Zemach Committee Report, pp. 4-5.

8 Zemach Committee Report, p. 10.

9 Zemach Committee Report, pp. 10-11.

10 According to the Zemach Committee Report (p. 125), "We estimate that natural gas-powered transportation is an interim solution with high economic feasibility for assimilation in the short term. Furthermore, we do not foresee an additional increase in gas consumption for transportation as of 2025, due to the penetration of vehicles powered by other means. Natural gas will serve the transportation market in Israel for 25 years, while due to various reasons (climate change, environmental considerations, natural resource limitations, and continued technological progress) the forecast is for it to be replaced by other sustainable energy technologies by the middle of the current century."

11 Ariella Berger, "Demand Forecast for Natural Gas," a presentation of the Economic Planning Institute, June 5, 2013.

12 Avi Bar Eli, "Export Less Gas, Keep More for the Economy," *The Marker*, May 25, 2013.

13 Meirav Arlozorov, "Bequeath to Our Children the Gas Money So They Can Fix What We Destroyed," *The Marker*, August 1, 2013.