



The Natural Gas Sector in Israel

An Economic Survey

November 2020

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Main Points:

- ❖ The global supply of natural gas has been in an upward trend over recent decades, reaching a historic peak of 4,088 BCM in 2019. At the same time, the demand for natural gas has also been in an upward trend, reaching 3,986 BCM in the same year.
- ❖ Israel exports natural gas to its neighbors, Jordan and Egypt, with whom it currently has signed agreements for the export of a total of 133 BCM over time, out of a potential of 340 BCM. Europe also represents a central export market for Israel, and the East-Med natural gas pipeline agreement between Israel, Cyprus, Greece, and later on also Italy, will enable Israel to export to Italy and to additional countries throughout Europe.
- ❖ The outbreak of the coronavirus led to a decline in global natural gas demand, due to a contraction of economic activity, which led to a 30% drop in the price of natural gas at the peak of the crisis.
- ❖ The outbreak of the pandemic led to a slowdown in natural gas consumption in Israel, after consumption had been in an uptrend between 2013-2019. However, the slowdown did not hurt government revenues from royalties due to the production of gas from the Leviathan reservoir, which started to operate in December 2019.
- ❖ The main gas supply to Israel comes from the “Tamar” reservoir, which is backed up by a liquid natural gas (LNG) collection facility, stored in the "Marine Link" moored buoy system. However, with the initiation of gas production from the Leviathan reservoir, and later on also from the Karish and Tanin reservoirs, a decline in natural gas prices is expected in the local market.
- ❖ In December 2019 natural gas production was initiated from the Leviathan reservoir, the largest reservoir in Israel with 500 BCM of natural gas, after this offshore reservoir was connected to the natural gas transmission network. Thus, the Israeli economy currently benefits from redundancies in natural gas supply sources, which enables the export of some of the gas produced.
- ❖ Natural gas consumption for the generation of electricity declined slightly in 2019, whereas natural gas consumption for industrial purposes increased in the same year.
- ❖ Currently, the main uses of natural gas are in the generation of electricity and in industry. However, recently natural gas has started to be consumed for household uses and it is expected to be used in the future also in the transportation sector, due to the transition of gasoline and diesel powered automobiles to electricity and compressed natural gas based systems.

- ❖ The baseline scenario for domestic demand forecasts that between 2018-2042 the aggregate demand for natural gas will equal 452 BCM. However, due to the high uncertainty surrounding the variables impacting the forecasts and the assumptions made, the government decided it must maintain 500 BCM of natural gas to fulfill domestic demand in Israel through 2042. In the short-term, the domestic demand for natural gas is expected to increase gradually to 14 BCM in 2025, and to 18 BCM by the year 2030.
- ❖ In our opinion, when the current crisis passes, natural gas consumption is expected to return to its upward trend. This comes particularly in light of the continued deployment of the national natural gas distribution network and the connection of new consumers to this network, and against the backdrop of the expected increase in natural gas demand for the generation of electricity. Furthermore, the government's decision to phase out the operations of a number of coal powered facilities for electricity generation by the end of 2022 and also setting a target for the complete cessation in the use of coal for electricity generation in Israel by 2028, against the backdrop of Israel's joining the Powering Past Coal Alliance (PPCA), are expected to raise natural gas demand among local producers of electricity.
- ❖ State revenues from the levies on profits from natural gas and oil from the Tamar, Leviathan, Karish, and Tanin reservoirs through 2064 are expected to amount to NIS 200bn. Meanwhile, it is expected that the state's revenues from levies on the profits from natural gas, oil, and other natural resources by 2030 will amount to NIS 13.5bn, such that in annual terms, in the coming decade, these sums do not entail substantial fiscal nor macro-economic consequences.

Global Background

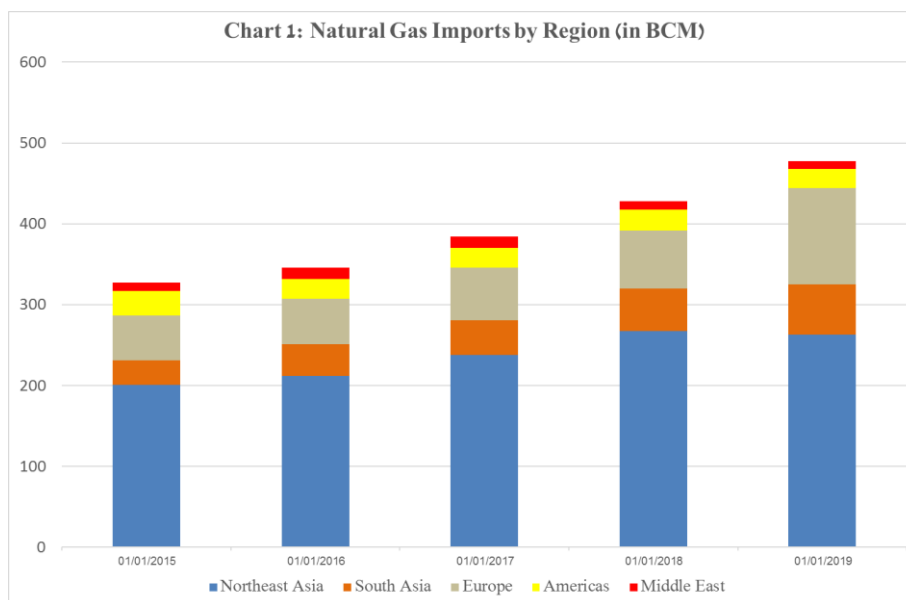
Natural gas production has been in a long-term upward trend over recent decades, which intensified over the last decade with the revolution in the US gas shale industry, made possible by the maturation of hydraulic fracturing technologies and underground horizontal drilling. To this must be added the expansion of China's industry and the concerns regarding air pollution that led to an increased use of natural gas, as well as the desire of Middle East oil exporters to diversify their sources of income in order to reduce their dependence on oil. This led many Middle East oil exporters to increase their natural gas production and exports.

Since the 2007-2008 financial crisis, natural gas production has increased at a stable annual rate of 2.7%. In 2019, natural gas production crossed the 4 TCM threshold for the first time, and reached a historic peak of 4,088 BCM, representing a 3.3% increase compared to 2018. The bulk of the

increase stemmed from the rise in natural gas production among OECD countries. The natural gas output of these countries increased 6.1% in 2019, reaching 1,538 BCM.

The US remains the largest natural gas producer, as the country increased its natural gas output in 2019 by 10.2% compared to 2018¹. The swing in the growth of the US gas shale industry also led to an increase in US natural gas exports, which increased between 2014-2019 from 1.514 TCF to 4.656 TCF, while the increase in natural gas exports via gas pipelines increased during this period by 89% from 1.497 TCF in 2014 to 2.837 TCF in 2019, and also liquid natural gas (LNG) exports increased sharply in this period, from 16.255 Bcf in 2014 to 1.819 TCF in 2019². US natural gas exports through pipelines are destined for Canada and Mexico, whereas all other countries that import natural gas from the US import LNG.

On the demand side, the global demand for natural gas has been in an on-going upward trend over recent decades with the growth in industry and against the backdrop of the trend involving the heightened use of cleaner energy. In 2019, the global demand for natural gas increased 1.5%, reaching a level of 3,986 BCM.



The demand for natural gas in China, India, and in other countries in south Asia increased over recent years without a matching increase in local resources, which led to an increase in natural gas

¹ Natural Gas Information Overview, IEA, July 2020.

² Natural Gas Summary, EIA. https://www.eia.gov/dnav/ng/ng_sum_lsum_dcu_nus_a.htm.

imports in these countries. In North America, the growth in natural gas demand leveled off, whereas there was an increase in domestic resources against the backdrop of the development of gas shales, and this led to a decline in natural gas imports. In South America, local demand is not expected to change substantially, and also no substantial increase is expected in production, despite new gas discoveries. This is because these new discoveries have been offset by a reduction in gas production in Venezuela due to US sanctions on the country. Gas production also declined in Argentina against the backdrop of concerns regarding economic difficulties there, which lowered foreign investments in its natural gas.

Some of the natural gas consumed in Europe is supplied by Norway and the Netherlands, which reduced natural gas production due to depletion of the reservoirs. Europe imports a notable portion of the gas it consumes from Russia via a gas pipeline transmission network. In addition, Europe imports gas via a pipeline from Algeria, and it also imports LNG from Nigeria, Qatar, and the US³.

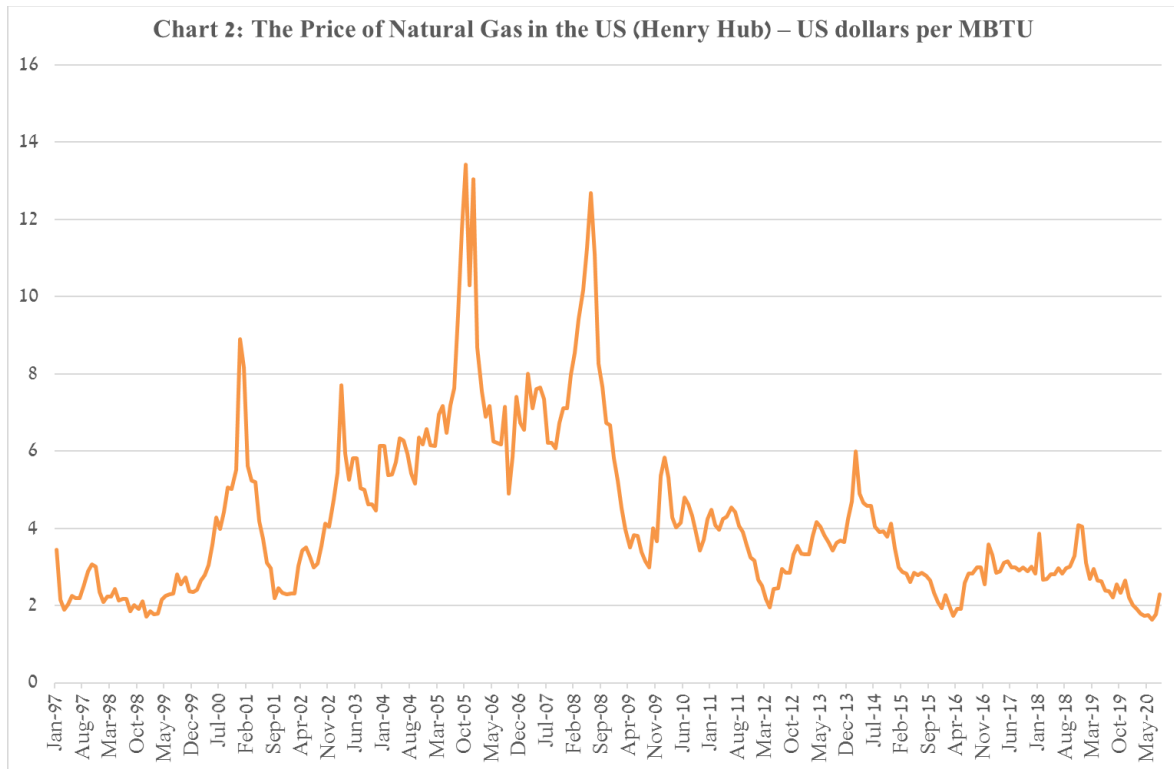
In the coming year, Russia is expected to complete the controversial Nord Stream 2 gas pipeline, which will transport natural gas directly from Russia to Germany. Completion of this pipeline could increase Europe's dependence in general, and Germany in particular, on Russian gas, which could increase Russia's political influence over European countries and weaken US power in the region and reduce payments to Eastern European countries with old pipelines, as their usage will decline with the completion of the construction of the Nord Stream 2 gas pipeline. The US is threatening to impose sanctions on the companies participating in the construction of this gas pipeline and it seems Germany is also examining the feasibility of using the gas pipeline in light of the considerable criticism it is attracting. However, for now it seems construction of the pipeline will be completed by mid-2021.

At the start of the 21st century, the price of natural gas in the US (the Henry Hub natural gas spot price) was in an upward trend, due to the high cost of production. With the initiation of the use of hydraulic fracturing technology (fracking) in 2008, the price of natural gas fell sharply, also against the backdrop of the financial crisis, and from there started a long-term downward trend.

The outbreak of the coronavirus and the economic shutdowns that followed in an attempt to stop the spread, which halted economic activity, led to a sharp decline in the price of natural gas around

³ Survey of the Global Natural Gas Sector, Ministry of Energy, July 2020.

the world, and the filling of natural gas stockpiles. The price of American natural gas fell from US\$2.04 per MMBTU on February 18, 2020 to US\$1.42 per MMBTU on June 26, 2020. Afterwards, the price started to climb against the backdrop of the global economic recovery and possibly also against the backdrop of expectations for a greater use of natural gas, at the expense of a notable decline in the production and use of oil and coal, assuming a victory of the Democratic Party in the 2020 US elections.



Since late August 2020, with the renewed rise in morbidity around the world and the spread of the second wave in a large number of countries, and in some countries a continued intensity of the first wave that never really ended, which led to concerns of a slowdown in economic activity and possibly also additional regional shutdowns, a slight decline occurred in the price of natural gas. However, the price in the US started to increase again in the beginning of the final quarter of 2020, against the backdrop of expectations for a colder-than-normal winter that is likely to increase the demand for natural gas, which is used for household heating and electricity generation.

The civil war in Libya has had a major impact on the natural gas market in the Middle East, due to the involvement of other countries that are exploiting the situation in favor of achieving their interests and expanding their influence in the region. The on-going conflict is between the government that is supported by Turkey, and the army that is supported by the United Arab

Emirates, Egypt, Saudi Arabia, and also by Russia. The president of Turkey, Recep Tayyip Erdogan, declared in 2019 that large portions of maritime territory between Turkey and Libya belong to Turkey. This move is intended to allow Turkey to take control of maritime territory where there may be oil and gas deposits while ignoring the rights of Greece and Cyprus in the region.

Turkey's action can also be seen as an effort to thwart the construction of the gas pipeline between Israel, Greece, and Cyprus (East-Med) that is expected to transport natural gas to Europe (as will be detailed later in this survey), which could undermine Turkey's status and power of influence in the Middle East. For now, the government in Libya has reached an agreement with the military, and the war between them has been stopped, yet the ceasefire agreement between them is fragile and the effects of the conflict on the region, and in particular the countries involved in the conflict, continue.

Looking ahead, demand for natural gas is expected to increase substantially over the coming decade and also during the subsequent decade. This is due to the transition of developed countries to cleaner energy and the setting of targets for reducing pollution in the European Union, together with the establishment of the Powering Past Coal Alliance (PPCA)⁴, whose purpose is to reduce the use of coal until the complete cessation of its use in 2030 among the OECD countries who are members of the coalition. Recently, the president of the European Council even argued that the European Union must raise the net greenhouse gas emissions reduction target by 2030 from 40% to at least 55% (compared to the air pollution recorded in 1990), which is expected to increase the rate of increase in demand for natural gas, as it is considered a cleaner energy source than the alternatives on the market, such as oil and diesel.

The Development of the Supply of Natural Gas in Israel

In the previous decade, the supply of natural gas to Israel originated primarily from the Mary B reservoir (Yam Tethys – YT), as well as from imports of natural gas from Egypt. Between 2004–2008 the Mary B reservoir supplied natural gas that was used mainly for electricity generation. The relatively small reservoir continued to produce natural gas until 2013, and in total it supplied 25 BCM of natural gas to Israel. Starting from 2008, Israel started to import natural gas from Egypt (from East Mediterranean Gas Company – EMG); however, imports fell substantially from the beginning of 2011 until April 2012 when the import was halted due to the many cases of sabotage

⁴ Ministry of Energy press release, December 17, 2018.

of the gas pipeline in the Sinai Peninsula. Between 2008–2012 Israel imported 4.7 BCM of Egyptian natural gas.

Starting from April 2013, the "Tamar" reservoir was used as a principle source of natural gas to the Israeli economy, together with the backing of the "Marine Link" moored buoy system, which is essentially a marine terminal located off the coast of the Israeli city of Hadera and is able to collect liquid natural gas (LNG) from tankers, and transform it back into gas form. In this manner this moored buoy system serves as an active backup for the Tamar gas reservoir.

This buoy system is in regular use in order to guarantee the steady, uninterrupted arrival of gas supply tankers (mainly from Trinidad), with its importance emphasized mainly when there is concern regarding excess demand for electricity in the economy and also in the event there are malfunctions that cause a drop in gas pressure from the "Tamar" reservoir, or when maintenance work is being conducted at the Tamar reservoir or in the gas pipelines from the reservoir. Between 2013–2019 the Tamar reservoir provided 61.4 BCM of natural gas to the Israeli economy, and a further 3 BCM of natural gas was imported through the "Marine Link" moored buoy system⁵.

During 2019, the Tamar reservoir served as the primary source for the supply of natural gas to Israel, supplying 10.48 BCM of natural gas to the economy, or 93% of the total supply of natural gas to the Israeli economy. The "Marine Link" moored buoy system provided 0.8 BCM during the year, representing 7% of the total supply of natural gas to the local Israeli economy. In December 2019, the Leviathan reservoir started to supply natural gas to the Israeli economy, supplying 0.005 BCM⁶.

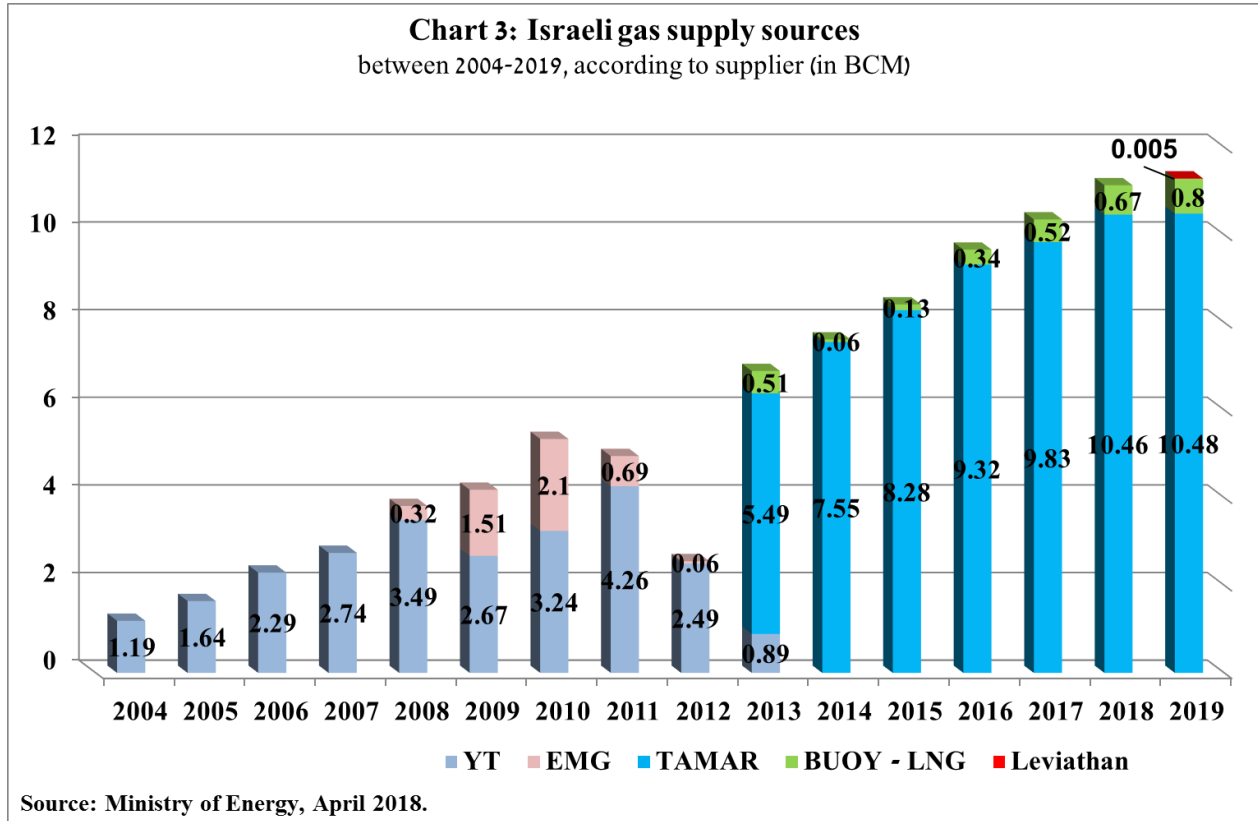
The initiation of the supply of natural gas from the Leviathan reservoir in the beginning of 2020, coupled with the expected supply of natural gas to Israel from the Karish and Tanin reservoirs, the supply of which from these reservoirs is expected to start in 2021⁷, will increase Israel's energy security and will likely lead to the cessation in the use of the "Marine Link" moored buoy system that has served as a backup to the Tamar reservoir during the time it was the sole source of natural gas for Israel. The position of the Ministry of Energy is that the Israel Electric Corporation (IEC) must continue its lease agreement for the "Clipper" ship, the ship that supplies liquid natural gas to

⁵ Survey on the Development of the Natural Gas Sector – 2019 Summary, Ministry of Energy, March 2020.

⁶ See footnote 5.

⁷ A Letter of Intent ("LoI") was signed between Energean and the Public Gas Corporation of Greece (DEPA) for the future sale of natural gas, Joint Press Release, Energean, January 2, 2020.

the "Marine Link" moored buoy facility, through the end of October 2022⁸. Furthermore, the introduction of new suppliers into the market, which until now has been controlled by the owners of the Tamar reservoir, is expected to contribute to an increase in competition in the natural gas market, thus leading to a decline in prices.



With the connection of the Leviathan reservoir, which is a large reservoir on an international scale that includes 500 BCM of natural gas, to the natural gas transmission network and the initiation of the flow of natural gas from it, the Israeli economy benefits from redundancies in natural gas supply sources, allowing natural gas to be exported to other countries. According to estimates, the Leviathan reservoir is expected to produce 7.0 BCM of natural gas in 2020, and another 8.9 BCM in 2021⁹. With the conclusion of the development of the Karish and Tanin reservoirs, which together hold 99 BCM of natural gas¹⁰, and their hook-up to the gas transmission network, it will be possible to produce 12 BCM of natural gas per year¹¹.

⁸ Periodical report for 2019, consolidated financial report from December 31, 2019, Note 35, Israel Electric Corporation (IEC).

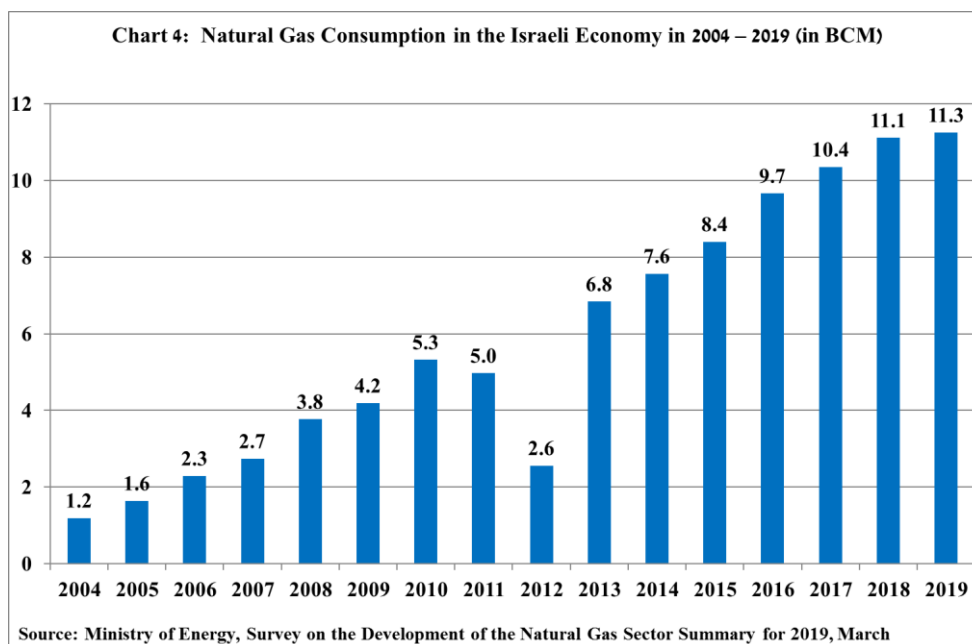
⁹ Periodical report for 2019, consolidated financial report from December 31, 2019, Note 35, Israel Electric Corporation (IEC).

¹⁰ Revenue Forecast of the Israeli Citizens' Fund and Barriers to Natural Gas Consumption, the Research and Information Center of the Israeli Knesset, September 2020.

¹¹ Survey on the Development of the Natural Gas Sector Summary for 2019, Ministry of Energy, March 2020.

The Development of Natural Gas Consumption in Israel

The upward trend in natural gas consumption continued in 2019. According to data from the Natural Gas Authority, Israel consumed 11.25 BCM of natural gas in 2019, representing an increase of 1.3% compared to 2018¹². Approximately 93% of the natural gas consumed in Israel was sourced from the "Tamar" reservoir, approximately 7% of the natural gas consumed was imported, and a small volume of natural gas was supplied at the end of December 2019 from the Leviathan reservoir.

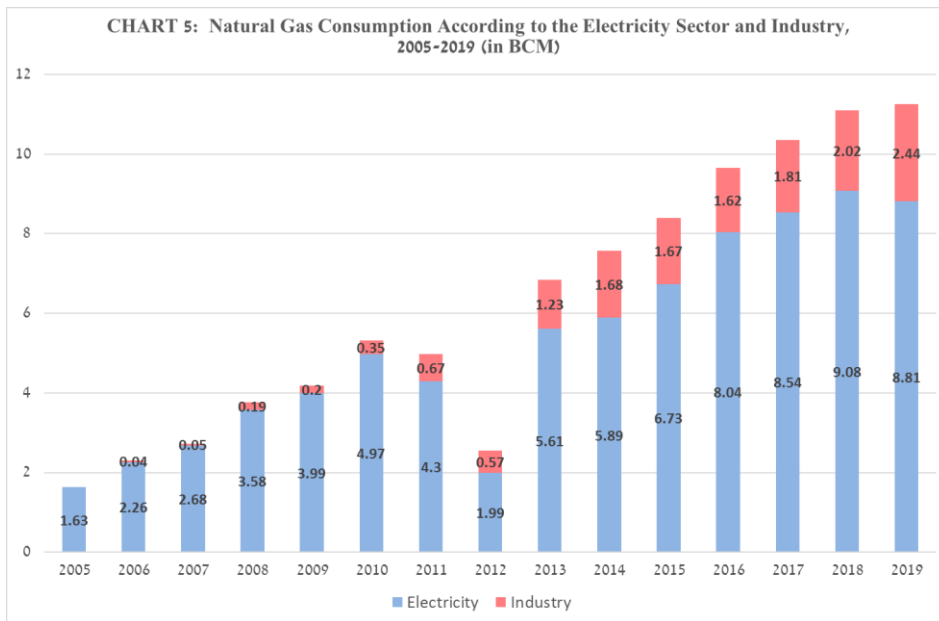


The upward trend in natural gas consumption in Israel has continued uninterrupted since 2013, back when natural gas production was initiated at the "Tamar" reservoir. The rate of increase in consumption increased until 2016, when natural gas consumption increased 15% compared to consumption in the preceding year; however, in the years 2017-2018 the rate of increase in consumption moderated and natural gas consumption in these years grew 7.14% and 7.34%, respectively. The bulk of the increase in consumption from 2017 stems primarily from the industrial sector, in which the growth increased in 2017-2018 by 12% each year, double the growth rate in natural gas consumption for electricity generation, and in 2019 natural gas consumption in the industrial sector increased 21%, whereas the consumption for electricity generation contracted, for the first time since 2013, by 3%.

The coronavirus led to a slowdown in economic activity in Israel, as well as around the world, which intensified in March-April 2020 and lowered the demand for natural gas. Natural gas consumption in March and April 2020 amounted to 56m MMBTU, representing a 13.6% decline from

¹² See footnote 11.

consumption in the parallel period of 2019 when natural gas consumption reached 64.5m MMBTU¹³. Natural gas is the main power source for the generation of electricity in Israel, accounting for approximately 65% of the electricity generated¹⁴.



In a breakdown according to consumers, natural gas consumption for the generation of electricity in March – April 2020 was 9.1% lower than the consumption in the parallel period of 2019, while the bulk of the decline in consumption occurred in March, and natural gas consumption in large industry (transmission consumers) fell in March - April 2020 by 13% compared to consumption in the parallel period of 2019.

In contrast, natural gas consumption by small industry and other consumers, who are consumers of the distribution network, increased in March-April by 14% compared to the parallel period of 2019. However, part of the increase stems from the expansion of the deployment of the distribution network and the connection of additional consumers to natural gas, which led to an increase in natural gas consumption independent of the coronavirus.

The spread of the coronavirus across the world and the decline in the demand for natural gas led to a situation such that at the peak of the first wave of the spread of the virus, a number of seaports in China and India declared a case of "force majeure". This prompted attempts of avoidance of

¹³ The Effect of the Coronavirus on Energy Consumption in Israel – Economic Division, Ministry of Energy, June 2020.

¹⁴ Energy in the Period of Corona Coping Effects and Opportunities, Ministry of Energy, June 2020.

honoring previous agreements and obligations, and these countries temporarily refused to receive international gas shipments that had been previously ordered.

The decline in demand led to a drop in natural gas prices around the world and to the filling of natural gas stockpiles, which is likely to impact supply in the coming months. A number of natural gas consumers took advantage of the low prices and purchased surplus quantities that can be used also after prices rise once again to their regular level, with the recovery from the crisis. Thus, for example, the Israel Electric Corporation (IEC) purchased liquid natural gas (LNG) containers in the spot market at a price 40%-45% below the price it pays to the owners of the "Tamar" reservoir.

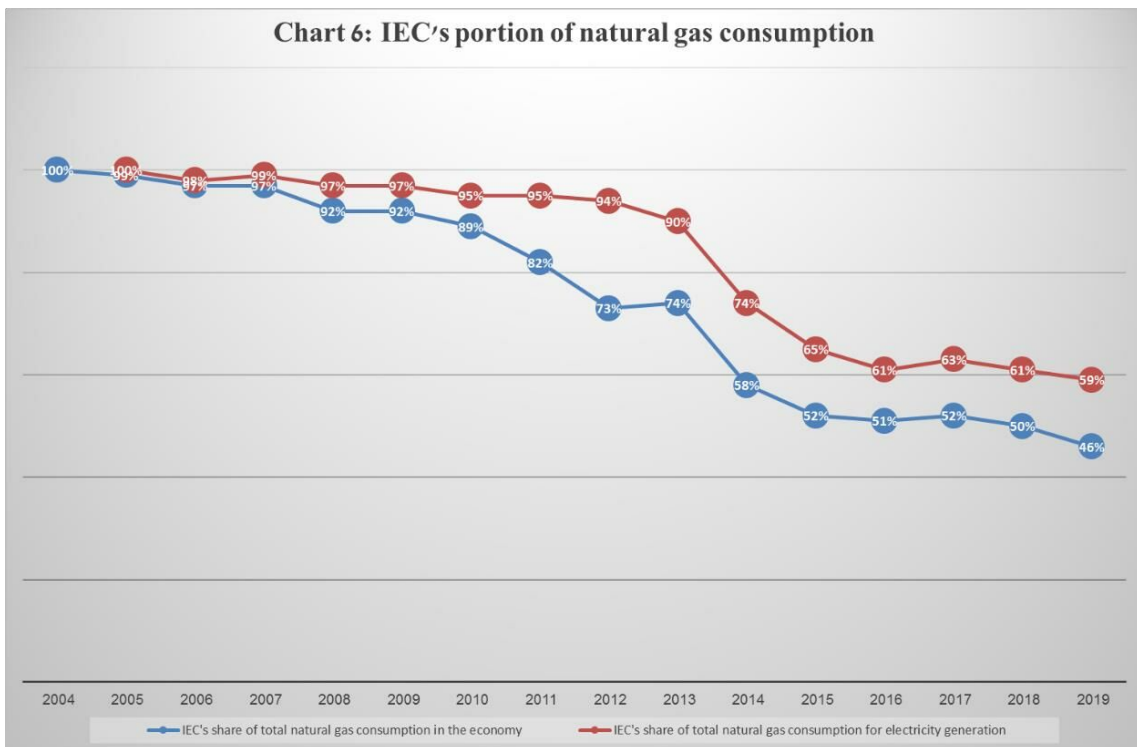
The Natural Gas Authority estimated before the outbreak of the coronavirus that the increase in natural gas consumption will continue. However, the spread of the coronavirus led to a drop in demand due to the slowdown that occurred in economic activity. In our opinion, when the crisis passes, natural gas consumption is expected to return to its upward trend, particularly in light of the continued deployment of the natural gas distribution network and the connection of new consumers to this network, and against the backdrop of the expected increase in the demand for natural gas in electricity generation.

Natural Gas For the Generation of Electricity

The use of natural gas for the generation of electricity has accelerated over recent years, yet declined slightly in 2019. The acceleration stems from, among other things, the government's decision to reduce the use of polluting energy sources, such as coal, heavy fuel oil, and diesel, which are being replaced by natural gas and renewable energy sources¹⁵. At the end of 2019, there were connected to the natural gas transmission network six power plants of large private electricity producers and five additional plants that use natural gas to generate electricity sold to consumers. This is in addition to the Israel Electric Corporation (IEC) power plants, which generate electricity using natural gas. Natural gas continues to be used as the main source for the generation of electricity, as 64% of electricity production in 2019 was generated using natural gas. This compares to 30% of electricity generation produced using coal, 5% created using renewable energy, with the remaining electricity generated using diesel and heavy fuel oil.

¹⁵ Government decision: number 542 from September 20, 2015 on the issue "Reducing Greenhouse Gas Emissions and Making Energy Consumption More Efficient", and number 3269 from December 17, 2017 on the issue "Confirmation of A National Plan for Energy Efficiency".

The bulk of natural gas consumption is used for the generation of electricity. In 2019, approximately 78% of natural gas consumption in the economy was used for electricity generation. The IEC is the main consumer of natural gas in the economy, accounting for 46% of the total consumption of natural gas in Israel, and 59% of the consumption of natural gas for electricity generation. This is despite the fact that its portion of consumption has been in a downward trend over the past decade. Natural gas consumption by the private electricity generators, which represent some competition to the IEC, and "on-site" co-generation facilities, which generate electricity at a higher rate of efficiency, increased, consuming 3.62 BCM of natural gas in 2019, compared to consumption of 3.25 BCM, more than 32% of the total natural gas consumption in 2019.



Looking ahead, the demand for natural gas to generate electricity is expected to climb gradually, to 11.0 BCM in 2025, to 13.5 BCM in 2030, and up to 16.5 BCM in 2042¹⁶. This comes after the government made a decision to cease operations of coal-fired units 1-4 at the Orot Rabin power plant by the beginning of 2022, with the connection of two additional gas reservoirs to the economy and with the establishment of alternative capacities to generate electricity using natural gas to power a co-generation power plant that operates at relatively high energy efficiency, which overall, takes into consideration renewable energy components, thereby reducing air pollution¹⁷.

¹⁶ Conclusions of the professional team for the periodical analysis of the recommendations of the committee for examining government policy for the natural gas sector in Israel, adopted in government decision 442 on June 23, 2013, Ministry of Energy, December 2018.

¹⁷ Government decision number 4080 from July 29, 2018.

Israel's natural gas consumption should increase also against the backdrop of Israel's joining the PPCA (Powering Past Coal Alliance)¹⁸, which aims to reduce the use of coal until it is completely phased out by 2030 within the OECD countries that are members of the coalition. Meanwhile, the goal of the government in Israel involves a gradual cessation in the use of coal in the electricity generation segment by 2028¹⁹, which will increase the demand of the IEC and private electricity generators for natural gas and renewable energy.

Natural Gas in Industry

The demand for natural gas in industry is second in importance behind electricity generation. Many industrial sectors consume energy for the purpose of producing thermal energy required in the processing and manufacturing of a variety of products, such as rubber, fuels, food, paper, pharmaceuticals, and more. Natural gas is a substitute with a lower level of pollution than other energy sources used by industry, such as kerosene and diesel, and it has energy efficiency and a relatively low cost compared to other alternatives. The largest consumers in the industrial sector are connected to natural gas through the transmission network under the responsibility of the government company Israel National Gas Lines Ltd. (INGL). Other consumers, such as medium- and small-sized industrial factories and hospitals, are connected to one of the regional distribution networks operated by private franchisees.

Status of Consumers Connected to the Distribution Network – December 2019			
	Signatories	Connected	Consumption
Negev Natural Gas	57	35	30
Natural Gas South	50	18	14
Hadera and the Valleys	42	10	8
Central	19	6	3
Marimon Natural Gas	43	7	5
Rotem Jerusalem	9	0	0
Total	220	76	60

As of the end of 2019, there are 25 large industrial customers connected to the natural gas transmission network, and there are 76 customers connected to the regional distribution networks.

¹⁸ Ministry of energy press release, December 17, 2018.

¹⁹ Energy sector targets for 2030, Ministry of Energy, March 2020.

In addition, there are another nine customers of compressed natural gas (CNG), transported by trucks. A clear majority of the consumers that consume natural gas through a connection to the distribution network are located in the Negev and Southern distribution region²⁰. Consumer concentration in the southern region may indicate a relatively slow hook-up rate in other distribution areas, and this may reflect higher demand potential in southern Israel than in other areas. Natural gas consumption in the industrial sector amounted to 2.4 BCM in 2019, an increase of about 20% compared to 2018 and an increase of about 33% compared to 2017.

The deployment of the transmission network is continuing and also the deployment of the regional distribution networks was accelerated, and in 2019, approximately 158km of distribution piping was deployed, such that at the end of 2019 there were 755km of gas transmission lines and 508km of distribution lines deployed throughout the country. For the deployment of the distribution network, it is intended to connect approximately 300 additional natural gas consumers to the regional distribution networks.

The impact of the government-imposed economic shutdown in March-April 2020 and the halt in economic activity led to a sharp drop in the consumption of natural gas in industry. The consumption of large industry, the consumers connected to the gas transmission network, in March-April 2020 contracted 13% compared to the parallel period in 2019. This decline in consumption is much larger than the decline registered in this period in the consumption of natural gas for electricity generation.

The natural gas consumption of the smaller consumers that are connected to the regional distribution networks, increased in March-April 2020 compared to the consumption in the parallel period last year. This is despite the fact that their natural gas consumption fell by a sharp rate in the first half of April 2020. It is possible the increase in natural gas consumption of the distribution networks' consumers stems from the broadened deployment of the distribution network over the past year and the connection of new natural gas consumers to the distribution network, such that the increase in natural gas consumption of this sector is independent of the coronavirus.

Looking ahead, the demand for natural gas in industry is expected to continue to increase. This is because most of the heavy industry required to connect to the transmission network is already almost

²⁰ Survey of developments in the natural gas sector, 2019 Summary, Ministry of Energy, March 2020.

fully connected, so the main parameter influencing the volume of natural gas consumption in heavy industry is the increase in fuel consumption of factories in this industry²¹, and also in light of the expected connection of small consumers to the regional distribution networks. It is estimated that natural gas consumption in heavy industry, petrochemicals, and also industry connected to the distribution network, is expected to increase to 3.0 BCM in 2025 and to 3.5 BCM in 2030. Natural gas consumption in heavy industry is expected to increase in the long-term (through 2042) by an annual rate of at least 1.5%. However, this estimate does not take into account the joining of new heavy industrial factories, due to the difficulty of predicting such developments²².

Natural Gas Consumption in Additional Sectors

Natural gas is mainly used to produce energy for electricity generation and in the industrial sectors. However, it has begun to penetrate into other areas with additional consumers, and even household consumers, and it may in the future also penetrate into other markets with consumers who are now far from the distribution network in their area. In 2019, the establishment of five sections for the distribution network was approved, in order to connect remote consumers.

This is after five other sections were approved in the past for the benefit of connecting consumers who are far from the distribution network in their area. In addition, the connection of household consumers to natural gas is continuing and Ofakim joined the cities of Dimona and Arad, where there are neighborhoods connected to natural gas, after the "Park" neighborhood in Ofakim was also connected to the distribution network.

In Be'er Sheva and Netivot, there is a neighborhood, one in each city, that is expected to soon be connected to the natural gas distribution network, and the possibility of connecting an apartment complex in Tel Aviv and an apartment complex in Rishon Lezion to the regional distribution network is being examined. In the future, there are 18 residential complexes around the country that are in various planning stages, which are scheduled to connect to natural gas through the regional distribution networks.

²¹ Conclusions of the professional team for the periodical analysis of the recommendations of the committee for examining government policy for the natural gas sector in Israel, adopted in government decision 442 on June 23, 2013, Ministry of Energy, December 2018.

²² See footnote 21.

The presence of natural gas reservoirs in Israel may contribute to the development of new industries in the petrochemical industry for downstream products produced from natural gas, such as the production of methanol and liquid fuels, where the final product can be exported to consumers in other countries or used by consumers in the Israeli market. It is estimated that the amount of natural gas consumed for the production of these downstream products is expected to rise in the next decade to 0.7 BCM in 2033²³. According to the Ministry of Economy, the consumption of natural gas in the industry of downstream products from natural gas in the amount of 1 BCM per year is expected to lead to an economic value added of NIS 200-400 million²⁴.

The transportation industry is also expected to be a consumer of natural gas, due to the possible transition of private, commercial, and public transport vehicles (buses and taxis) from the use of gasoline and diesel to the use of electricity and compressed natural gas (CNG). This trend is supported by government decisions, and the goal of the Ministry of Energy is that from 2030 the entry of gasoline or diesel-powered vehicles into Israel will be banned²⁵.

It appears that private vehicles will be electric driven, commercial vehicles and heavy trucks will be powered using compressed natural gas (CNG), and public transport (buses and taxis) will be combined such that some will be powered by electricity and some by CNG. There is a high degree of uncertainty regarding the demand for natural gas of the transportation industry due to a large number of unknown parameters, with one of the key parameters being the penetration rate of electric vehicles and vehicles powered by compressed natural gas (CNG).

It is estimated that in 2032 there will be between 0.5m and 1.5m electric and CNG-powered vehicles in Israel. Looking ahead, in the scenario that assumes there will be 1.5m electric vehicles in Israel by 2032, the natural gas consumption of the transportation industry is expected to be 46 BCM by 2042.

²³ See footnote 21.

²⁴ Opinion of the Ministry of Economy and Industry to the professional team for formulating recommendations for the export of downstream products manufactured from natural gas – sub-committee pursuant to section 3 of government decision 4442, May 2019.

²⁵ Goals for the energy sector for 2030, Ministry of Energy, March 2019.

Natural Gas Demand Forecasts for the Domestic Market

Future domestic demand depends on a large number of parameters with a relatively high degree of uncertainty, and on the assumptions made about future developments in them. The professional team of the Tzemach Committee presents in its interim report eight scenarios for developments in the demand for natural gas in Israel by 2042²⁶.

The main parameters expected to affect future demand for natural gas are: the growth rate of electricity generation, the degree of penetration of electric vehicles, the degree of compliance with energy efficiency targets and renewable energy generation targets, the degree of implementation of the plan to close coal fired units 1-4 at the Orot Rabin power plant by 2022, and the closure of all coal-fired units used for the generation of electricity by 2030. The scenarios presented in the report assume various assumptions about the parameters and from them it appears the cumulative demand for natural gas in the years 2018-2042 is expected to range between 374 BCM and 491 BCM.

The baselie scenario adopted by the professional team of the Tzemach Committee assumes the closure of all coal-fired electricity generation units by 2028, the penetration of 1.5m electric vehicles by 2032 and a ban on the sale of gasoline and diesel powered vehicles from 2030, a normative increase in electricity demand in the coming decades under the assumption of the achievement of government targets in the field of energy efficiency and electricity generation through renewable energies, average growth in industry, demand for transportation in accordance with government plans, and the establishment of a facility for the production of natural gas downstream products. This scenario predicts the cumulative domestic demand for natural gas between 2018 and 2042 will equal 452 BCM; however, in light of the considerable uncertainty, the team decided that a sufficient amount of natural gas should be maintained even to meet the extreme scenario where Israel's natural gas consumption in 2018-2042 will be 491 BCM.

A 2013 government decision adopting the Tzemach Committee report²⁷ stated that a quantity of 540 BCM of natural gas should be maintained for consumption in Israel's domestic market between 2013-2042²⁸. The professional team that examined the conclusions of the Tzemach Committee in

²⁶ Conclusions of the professional team for the periodical analysis of the recommendations of the committee for examining government policy for Israel's natural gas sector, adopted in government decision 442 on June 23, 2013, Ministry of Energy, December 2018.

²⁷ The committee for examining government policy related to the natural gas sector in Israel – the Tzemach Committee, September 2012.

²⁸ Government decision number 442 from June 23, 2013.

2018 recommended not to change the decision. Since between the years 2013-2017, 40 BCM of natural gas were consumed, then according to the government's decision, a quantity of 500 BCM of natural gas must be guaranteed for consumption in the local market between the years 2018-2042. This will be so that there is no substantial difference between the amount the economy may consume according to the scenarios the team examined for this period, and the amount that was decided to be kept for the benefit of the economy in the government decision. The Israeli government approved

Forecast Natural Gas Demand in Israel (in BCM) – Baseline Scenario

	2025	2030	2035	2040	2042
Electricity	11.0	13.5	14.7	16.0	16.5
Industry	2.7	3.0	3.2	3.4	3.5
Transportation	0.3	1.3	3.0	4.7	5.1
Petrochemicals	0.3	0.5	0.7	0.7	0.7
Total local demand	14.3	18.3	21.6	24.8	25.8

Source: Conclusions of the professional team for the periodical analysis of the recommendations of the committee for examining government policy for Israel's natural gas sector, adopted in government decision 442 on June 23, 2013, Ministry of Energy, December 2018.

the conclusions of the professional team²⁹ and this means the natural gas produced beyond the 500 BCM level reserved for the local market can be exported, which is expected to increase the potential growth rate of the Israeli economy.

Developments Surrounding Agreements for Natural Gas Exports from Israel

The development of the Tamar and Leviathan gas reservoirs has increased the natural gas production potential in Israel to beyond the forecast domestic demand by 2042, which enables the export of natural gas from Israel. Israel has the ability to export natural gas only through gas pipelines and not in the form of liquefied natural gas (LNG), since in Israel there is no suitable facility for liquefying the gas for export. Therefore, the target markets for natural gas exports from Israel are its immediate neighbors, Jordan, Egypt and the Palestinian Authority, as well as European countries, via Greece and Cyprus. European countries have an interest in importing natural gas from Israel, as this will help them diversify their natural gas sources and reduce their dependence on Russian natural gas, which may also reduce Russia's political influence on some European countries.

²⁹ Ministry of Energy press release, January 10, 2019.

It should be noted that the Ministry of Energy has begun examining the construction of an offshore, or floating, facility for liquefied natural gas (FLNG)³⁰, which may allow Israel to export natural gas to distant destinations such as Asia and the US. However, competition in Asia's natural gas market is tough, and large natural gas exporters, such as Russia, will reduce prices so as not to lose market share.

In January 2017, Israel began exporting natural gas to a factory along the Jordanian side of the Dead Sea for the first time through NBL Eastern Mediterranean Marketing Limited, after the agreements signed by the Tamar partners undertook to supply it with 3 BCM of natural gas over a period of approximately 15 years³¹. In September 2016, agreements were signed between the Leviathan partners and the Jordanian Electric Company (NEPCO) for the supply of up to 45 BCM of natural gas for a period of 15 years, and at the end of 2019 natural gas began flowing from the Leviathan reservoir to customers with whom gas agreements were signed, and since the beginning of 2020 the transport of natural has started also to the electric company of Jordan³².

Egypt represents a major destination for natural gas exports from Israel, and according to agreements signed with Egyptian Dolphinus Holdings, Israel will export approximately 25.3 BCM of natural gas from the Tamar reservoir and approximately 60 BCM of natural gas from the Leviathan reservoir for a period of about 15 years. The flow of gas to Egypt from the Leviathan reservoir began in January 2020 and from the Tamar gas reservoir gas exports to Egypt began in July 2020³³. Natural gas exports to Egypt will be through the gas pipeline that was previously used by Israel to import gas from Egypt.

Europe represents an important export destination for Israel both due to the economic benefits of this move as it will serve as a foothold in one of the main natural gas import centers, which is expected to increase Israel's energy exports, and also due to the encouragement the country will receive for further investment in exploration and development of additional natural gas reserves. There are also geopolitical consequences that may evolve from exporting natural gas to Europe.

³⁰ Public participation – possible locations for the construction of a marine facility for the export of natural gas, Ministry of Energy, March 29, 2020.

³¹ Annual company report from 2017 and also second quarter 2020 company report, Delek Drilling.

³² Second quarter 2020 company report, Delek Drilling.

³³ See footnote 32.

In July 2020, the Israeli government approved the East-Med natural gas pipeline agreement³⁴, signed in early 2020 between Israel, Greece, and Cyprus for the laying of an underwater natural gas pipeline that will lead from Israel to Europe via Greece and Cyprus, and will transport natural gas to Italy and other European countries³⁵. According to the plan, the pipeline construction is expected to be completed by 2025³⁶. Italy is expected to sign at a later stage, based on the understandings signed between the countries' energy ministers at the end of 2017. In the initial stage, the pipeline capacity will be 10 BCM per year, but it will be possible to double the capacity to 20 BCM of natural gas per year³⁷.

State Revenues from Natural Gas and Oil

State revenues from oil and natural gas production consist of royalties determined according to the amount and value of gas sold, corporation tax, as well as fees and levies on oil and natural gas profits (excess profits tax - Sheshinski levy³⁸), which is determined depending on profits generated from the reservoir that is calculated separately. The latter is expected to incur the heaviest tax rate.

State revenues from levies on oil and natural gas profits are deposited in the Israeli Citizens' Fund (a sovereign wealth fund, hereinafter: the "Fund"), which was established in 2014³⁹ for two main reasons, first being to assist in dealing with large revenues that are expected in foreign currency from the sale of natural resources, natural gas, and oil, which may strengthen the shekel relative to other currencies. Secondly, in order to enable the use of income from perishable natural resources for the benefit of future generations as well. To date, the fund has not yet started operating, both because it has not yet accumulated enough funds from the profits of the gas companies to meet the NIS 1bn threshold set by law for the beginning of the investment fund's activities, and also for bureaucratic reasons and the fact that the institutions of the fund have not yet been established⁴⁰.

³⁴ Government decision number 235 from July 19, 2020 on the topic "Ratification of an inter-governmental agreement between the Republic of Cyprus, the State of Israel, Greece, and the Italian Republic regarding a pipeline system for transporting natural gas from the Eastern Mediterranean to European markets."

³⁵ Press release from the Ministry of Energy, "In the tri-lateral summit meeting with the participation of the prime minister of Israel, the prime minister of Greece, and the president of Cyprus: the East-Med gas pipeline agreement was signed", January 2, 2020.

³⁶ See footnote 35.

³⁷ Press release from the Ministry of Energy, "The government confirmed the East-Med Agreement that was created by the Israeli minister of energy, Dr. Yuval Steinmentz, together with the energy ministers of Cyprus, Greece, and Italy", July 19, 2020.

³⁸ Tax on Profits From Natural Resources Law, 5771 (2011).

³⁹ The Israeli Citizens' Fund Law, 5774 (2014)

⁴⁰ Speech by the Deputy-Governor of the Bank of Israel at the meeting of the Special Committee for the Supervision of the Fund for the Management of State Revenues from Levies on Gas and Oil Profits, Press Release – Bank of Israel, July 7, 2020.

Total state revenues from the rewards for oil and gas between the years 2012-2019 amounts to approximately NIS 5.5b. Approximately 94% of the royalties in this period came from the Tamar reservoir. The levies on natural gas oil profits, which are deposited in the Fund, collected between the years 2011-2019, amount to approximately NIS 474m. Of this, approximately NIS 419m derives from levies on natural gas and approximately NIS 55m from the levy on other natural resources⁴¹. In 2019, the total rewards that the state received from oil and natural gas were about NIS 842m, of which about NIS 836m were from the Tamar reservoir⁴². During the first half of 2020, the state's revenues from gas and oil royalties equaled approximately NIS 473m, an increase of approximately 13.44% compared to the first half of 2019. Of these, approximately NIS 249m derived from the Tamar reservoir, a decrease of approximately 40% compared to the first half of 2019, and about NIS 223m came from the Leviathan reservoir⁴³.

Looking ahead, the Israel Tax Authority estimates state revenues from levies on the profits of natural gas and oil from the Tamar, Leviathan, Karish, and Tanin reservoirs will amount to NIS 200bn through 2064⁴⁴. This estimate is based on the expectation that state revenues from levies on the profits of oil natural gas and other natural resources through 2030 are expected to amount to NIS 13.5bn⁴⁵.

Antitrust

The entry of American gas giant Chevron into Israel, with the acquisition of Noble Energy, may help export natural gas and connect the East-Med gas pipeline between Israel and Europe. With its entry into the Israeli gas market, Chevron decided to use its veto power and stop selling gas from the Tamar reservoir to the IEC at a price cheaper than the original price set between them.

Delek Drilling and Chevron hold cross-ownership of Israel's two largest gas reserves. Chevron holds 25% of the Tamar reservoir and 39.66% of the Leviathan reservoir, and Delek Drilling holds 22%

⁴¹ Discussion of the Special Committee on the Matter of the Israeli Citizens' Fund, Israel Tax Authority presentation, July 28, 2020.

⁴² Report on the status of the establishment of the Fund for the Management of State Revenues from Levies on Natural Gas and Natural Resources – Revised, Center for Research and Information – the Knesset, July 30, 2020.

⁴³ Report on the revenues of the Natural Resources Administration for the period ended June 30, 2020, Ministry of Energy.

⁴⁴ This estimate is based on many assumptions, relating to, among other things, future prices of oil and natural gas.

⁴⁵ Discussion of the Special Committee on the matter of the Israeli Citizen's Fund, Israel Tax Authority presentation, July 28, 2020.

of the Tamar reservoir and 45.34% of the Leviathan reservoir. This ownership structure increases the economic viability for Delek Drilling and Chevron to sell natural gas from the Leviathan reservoir, compared to the alternative of selling from the Tamar reservoir, since the share of profits in the Leviathan reservoir is larger. The challenging ownership structure in the Israeli gas market was approved in the government decision on the national gas outline⁴⁶, which states that Noble Energy (which was acquired by Chevron) will have a veto right in the Tamar reservoir up until the time at which Noble's holdings in the Tamar reservoir will not be above 25%, and until no later than December 2021.

According to the opinion of Israel's Deputy Attorney General (Economic Law), the decrease in Chevron's holding in the Tamar reservoir is due to the sale of part of Noble Energy (because it was acquired by Chevron) to Tamar Petroleum, but this sale is not considered a sale in order to comply with the national gas outline because Delek has a significant holding in Tamar Petroleum. However, Chevron is not yet considered to be violating the gas agreement since it was given until December 2021 in order to comply with the national gas outline, but all the other partners in the Tamar reservoir are forbidden from holding a veto right in the Tamar reservoir. This means that Chevron actually controls the Israeli gas market until December 2021 or until it reaches a 25% holding in the Tamar reservoir, which will also be considered according to the approved national gas outline, meaning that the sale will not be to a company affiliated with Delek or Chevron⁴⁷.

The government announced in April to the partners in the Tamar reservoir that it would allow the parties to reach agreements that would remove the state's need to intervene in the matter, but the parties have not yet presented an agreed outline that cancels the right to veto. The Attorney-General of the government also said that the partners in the Tamar reservoir could reach an arrangement for the separate sale of gas or reach an arrangement for decision-making according to a majority opinion and thus cancel the veto right⁴⁸. In our opinion, as long as Chevron can legally hold a veto right in the Tamar reservoir, which is in fact until December 2021, it is not expected to reach any agreement that will reduce its power and ability to control the natural gas market unless it is offered compensation for its loss of power, or under threat of sanctions by the state, with an emphasis on

⁴⁶ Government decision number 476 from August 16, 2015 on the topic "Outline for increasing the quantity of natural gas produced from the 'Tamar' natural gas field and a rapid development of the 'Leviathan,' 'Karish,' and 'Tanin' gas fields and other natural gas fields".

⁴⁷ Competition Authority, publication on September 6, 2020 on the topic "Government representatives informed Noble and Delek that they hold a veto right in Tamar: Noble must remove the veto right by the deadline set in the national gas outline, while Delek is required to remove the veto right within a month."

⁴⁸ See footnote 47.

the Competition Authority, which can significantly harm its power in the market or which may threaten prosecution for abusing its monopolistic power. We emphasize that Chevron is a large company with strong economic resilience, such that insignificant economic sanctions are not likely to affect it.

Summary

The impact of the coronavirus, which led to a slowdown in economic activity and caused a drop in the consumption of natural gas during the first wave of the spread of the virus, is expected to be temporary. In the medium- and long-terms, natural gas consumption is expected to increase, both in Israel and around the world, against the backdrop of the trend that is gaining momentum among developed countries to lower the use of polluting energy and replace it with natural gas, which pollutes less, and also renewable energy.

Natural gas consumption in Israel is in an upward trend that is expected to continue, against the backdrop of plans for the closure / conversion of the country's coal-fired power stations and the transition to the generation of electricity using natural gas and renewable energy, and in light of the on-going connection of new consumers to the gas distribution network and even its expansion to more remote consumers. In addition, the plan to connect residential neighborhoods to natural gas and to introduce natural gas into the private and public transportation industry will also increase natural gas consumption in Israel.

According to the Natural Gas Authority, the consumption of liquefied petroleum gas (LPG, gas for cooking) in Israel is estimated at 0.7 BCM per year. It is considered economically viable to connect new neighborhoods to natural gas, but not to connect existing homes because of infrastructure costs, conversion, and equipment replacement. However, the companies that obtained the distribution tenders are the same companies that import LPG; therefore, their interest in connecting homes and industries to LPG is not great⁴⁹. This problematic ownership structure could delay the connection of new neighborhoods to natural gas if government oversight and guidance are non-assertive and lack incentives.

⁴⁹ The Special Committee on the Israeli Citizens' Fund, chaired by MK Avi Dichter – Continuation Map for Discussion, the Knesset, October 11, 2020.

The use of natural gas has many advantages over many other energy alternatives. It is a more environmentally friendly energy source compared to other types of fuel, and therefore has milder negative externalities compared to the main alternatives, and is usually also more efficient and cheaper per unit of energy. For example, between 2004-2019, the Israeli economy saved NIS 71.3bn in direct energy costs⁵⁰. The expansion of the use of natural gas into all sectors of the economy is expected to contribute to a substantial reduction in the energy costs of the economy, to an improvement in labor productivity, and as a result, also to a reduction in the cost of living and an increase in household disposable income.

In addition, the use of natural gas also has an indirect positive impact on the economy, such as the production of downstream products and an improvement in international competitiveness. The Ministry of Economy estimates that the consumption of natural gas in the manufacture of downstream products from natural gas in the amount of 1 BCM per year, is expected to lead to an economic value added of NIS 200-400m⁵¹.

With the initiation of natural gas production from the Leviathan reservoir, natural gas exports from Israel are expected to increase, and the future connection of the existing Karish and Tanin reservoirs will also help the growth of Israeli exports. Meanwhile, Israel's main export destinations are its neighbors, Egypt and Jordan. Only in the long run will gas export to Europe is expected, following the completion of the pipeline construction scheduled to be by 2025. The signing of cooperation agreements between Israel, Greece, and Cyprus is expected to strengthen Israel's cooperation with the European Union, allow Israel to enter the European natural gas market, and increase the volume of its natural gas exports, along with creating geopolitical collaborations that will affect the entire region.

Natural gas exports are expected to increase Israel's current account surplus over time, this due to the reduction in energy imports on the one hand, and an increase in natural gas exports on the other. According to data on Israel's energy account, oil imports to Israel amount to approximately 11.8 toe (tonne of oil equivalent), with a monetary value of US\$6bn per year. The degree of substitutability from the use of crude oil to natural gas is expected to increase over time, while reducing the use of

⁵⁰ Survey on Developments in the Natural Gas Sector 2019 Summary, Ministry of Energy, March 2020.

⁵¹ Opinion of the Ministry of Economy and Industry to the professional team for formulating recommendations for the export of downstream products produced from natural gas – the Subcommittee pursuant to Section 3 of Government Decision 4442, May 2019.

petroleum products for transportation and completely eliminating the use of petroleum products for electricity generation and production of thermal components (steam and hot water).

Coal imports into Israel amount to 5m toe, which is declining over time, at a monetary cost of approximately US\$900m per year. This is an annual aggregate equivalent equal to about 5-6 BCM, while the consumption of each 1 BCM of natural gas as a substitute for coal increases the state's revenues by about NIS 180m⁵². The monetary value of these two imported energy components is close to about US\$7bn per year, and in addition there are other imported energy components, so that the total import of Israel's energy materials in 2019 amounted to about US\$9.3bn. During 2020, consumption decreased and prices fell, but this is still a volume of imports equivalent to more than 2% of GDP per year.

In our view, a reduction in these import components, and beyond the use of natural gas, may contribute a cumulative addition to the surplus in the current account of the balance of payments to an order of magnitude equal to 0.1 – 0.2 percentage of GDP annually over the next decade. This move will be supported by the continuing expansion in the natural gas distribution network that will connect more consumers to natural gas, which contributes to reducing energy imports. Support for reducing energy imports will also come from accelerating the transition to electricity generation using natural gas and renewable energies instead of other less-cleaner alternatives.

The increase in natural gas exports is likely to contribute over time to forces leading to the appreciation of the shekel, due to its positive contribution to the current account surplus and also due to the increase in foreign investments that are expected to flow into Israel as the country is perceived to be more wealthy in the eyes of investors, with respect to the availability of natural gas and its use. This is expected to increase the demand for shekels.

Israel's gas exports are still low at present, but are expected to rise in the coming years to approximately US\$1bn per year, equivalent to about a quarter of a percent of GDP. Hence, all other factors remaining constant, the continued reduction in energy imports, alongside the increase in gas exports, may cumulatively increase the current account surplus of Israel's balance of payments substantially over time.

⁵² The Special Committee on the Israeli Citizens' Fund chaired by MK Avi Dichter – Continuation Map for Discussion, the Knesset, October 11, 2020.

Israel's sovereign wealth fund, when it will be activated, is expected to gradually assist in offsetting a certain portion of the shekel appreciation through non-hedged investments of royalties in assets abroad. In addition, the Bank of Israel's active intervention in the foreign exchange market will be required to offset much of this appreciation.

The contribution of natural gas production to Israel's GDP in the coming years is still expected to be modest, due to the still limited demand in the domestic market. The OECD estimates natural gas is expected to contribute approximately 0.3% of GDP to economic growth in 2020 and about 0.2% of GDP in 2022-2023⁵³. Most of the future contribution of natural gas to GDP is expected to be from the increase in exports; therefore, the development of the natural gas economy in Israel should be encouraged.

Israel's international trade agreements should be strengthened, as should the country's ability to penetrate new markets, with an emphasis on the European energy market. Another positive factor is the improvement in the competitiveness of the Israeli economy resulting from the access to cheap local energy, a development that may help some of Israel's export industries, especially at medium and low levels of technology intensity. All of these factors are expected to contribute in the longer term to a growth potential greater than the OECD's estimate for the coming years.

⁵³ OECD Economic Surveys Israel, September 2020.

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