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Contributing Editors:

**Michael Burns & Julia Derrick**

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# Israel

Dr. Tzipi Iser Itsiq  
Lipa Meir & Co.

## **Overview of the current energy mix, and the place in the market of different energy sources**

The energy sector in Israel has witnessed steady growth over the past few decades. According to official figures, total electric power production in the Israeli market has increased from approximately 53.5 billion kWh in 2009 to 73 billion kWh in 2018, an incremental increase of 32%, compared to a 19% increase in population and a 61% increase in production of goods over that time period.

Total electric power production in the market has increased steadily over the years, apart from 2013, in which total electric power production in the market fell by 3.2%.

In the upcoming decade, electric power consumption is expected to continue rising, due to natural population and economic growth as well as national infrastructure initiatives such as electrification of railway lines and growth in the electric vehicle sector. There are various forecasts for the increase in electric power consumption – according to the Bank of Israel, the annual rate of increase in electricity demand is expected to range between 2.7% and 3%.

In 2018, electric power production in the Israeli market came from the following sources: approximately 29.3% from coal; 33.2% from natural gas; 4.4% from liquid natural gas (LNG); 0.6% from diesel; and 0.1% from fuel oil. The Israel Electric Corporation (IEC), a government company, produced a total of 47.5 billion kWh of electricity, about 67.6% of the total electricity production in the market in 2018. Production by independent power producers (IPPs) using natural gas (private power stations) was approximately 29.3%, and electricity production from renewable energy sources was 2.9% of the total in 2018.

## **Changes in the energy situation in the last 12 months which are likely to have an impact on future direction or policy**

Statements by Israel's Ministry of Energy, outlined below, indicate that by 2030 the distribution of fossil fuel use in the Israeli market is expected to be drastically different from the distribution documented in 2010, with a significant increase in natural gas consumption at the expense of other energy sources. In 2013, natural gas accounted for only 26% of total energy sources in the market, in reference to the total consumption of 23,700 tons of oil equivalent (TOE). The national Gas Authority estimates that by 2030 total energy consumption in the economy will reach 34,900 TOE, and projects that natural gas will make up 47% of all energy sources in the market. This change will stem primarily from the expected use of natural gas sources discovered in recent years in Israel's exclusive economic zone (EEZ). A detailed description of these reservoirs follows.

In the last decade, several reservoirs of natural gas have been found in Israel's EEZ, in the

Mediterranean Sea, west of the country's coastline. Some of the reservoirs are small, containing minimal quantities that are not economically significant, but some are giant reservoirs with commercial potential and are already in use by IEC and various industrial operations.

The "Tamar" reservoir is a natural gas field that lies in the Mediterranean Sea about 90 kilometres west of Haifa and at a depth of about 1,700 metres below the sea surface. Although it is not the first gas field with economic potential to be discovered in Israel, as of this article. "Tamar" is the only active natural gas reservoir, producing 10 billion cubic metres (BCM) of natural gas per year. The total quantity of gas that can be extracted from the reservoir has been estimated at 307 BCM.

The "Leviathan" reservoir is a natural gas field in the Mediterranean Sea, about 130 kilometres west of Haifa (and to the west of the "Tamar" reservoir) and at a depth of about 1,500 metres below the sea's surface. The reservoir was discovered in late 2010, and is one of the largest discoveries in the world of natural gas in deep waters. Experts estimate its volume at 621 BCM of natural gas, in addition to 40 million barrels of natural gas condensate, making the "Leviathan" highly promising for Israel's energy market and as an engine of significant economic growth for the country and its citizens.

Two smaller gas reservoirs have also been discovered, known as "Karish and Tanin" (Shark and Alligator), located in the northern region of Israel's EEZ. The "Tanin" reservoir was discovered in 2011 to the northeast of the "Leviathan" reservoir, and the volume of natural gas it contains is considered the third in size to be discovered on Israeli territory. The "Karish" reservoir was discovered in 2013 to the northeast of the "Tamar" reservoir and is believed to be the fourth-largest in the country's territory. In total, it is estimated that the "Karish" and "Tanin" reservoirs contain between 60 and 70 BCM of natural gas, and their development, drilling, and transport costs are expected to be lower than the corresponding costs for the "Tamar" and "Leviathan" reservoirs. This is due in part to their size and in part to their relatively short distance to other reservoirs, which would allow the "Karish" and "Tanin" reservoirs to make use of the infrastructures in place for "Tamar" and "Leviathan".

Over the past year, alongside the supply of natural gas to the Israeli energy market from the "Tamar" reservoir, development work continues apace on the (permanent) production platform for the "Leviathan" field, which will be located in Israel's territorial waters (approximately 10 kilometres from the coast). Construction of a floating production storage and offloading (FPSO) unit is also under way, for gas extraction from the "Karish and Tanin" reservoirs.

The total quantity of natural gas consumed in Israel has risen, as construction of a pipeline transmission system progresses. The pipeline's construction has been carried out by the government owned corporation "Israel Natural Gas Lines Ltd." (INGL) ever since that corporation's founding in 2003. The overall length of the system, as of today, is approximately 650 km.

INGL is currently working on several additional projects, in various stages of planning and installation, including installing additional sections and doubling existing lines. INGL is also continuously increasing the number of clients and hooking up additional consumers to the system.

On August 16, 2015, a significant governmental decision was made (re-adopted in a decision on May 22, 2016), entitled "A Draft Plan for Increasing the Quantity of Natural Gas Extracted from the 'Tamar' Natural Gas Field and Rapid Development of the 'Leviathan', 'Karish', 'Tanin' and other Natural Gas Fields" (the "Gas Draft Plan") which took effect on

December, 17, 2015. The draft plan includes nine chapters detailing the government's intentions regarding management of the natural gas industry. It is intended to accelerate development of the gas reservoirs and promote their incorporation into the Israeli energy market. The Gas Draft Plan underwent judicial review by the Supreme Court sitting as the High Court of Justice, and the Israeli market began to implement the plan; since then, significant progress has been seen in the development of Israel's natural gas industry.

### **Developments in government policy/strategy/approach**

On July 26, 2018, an amendment to the Electric Power Sector Law went into effect, mandating and regulating reform of the electric power sector in Israel. The amendment to the law resulted from a government decision on reform of the electric power industry, in accordance with policy principles publicised by the Minister of Energy. Principles of the reform include steps to increase competition in the electric power industry and improve the efficiency of IEC (the governmental corporation for production, transport, and distribution of electricity), as described below:

1. Management of the electric power system – Management will be transferred from IEC to another government company (System Management Company Ltd.), with the goal of reducing existing conflicts of interest between the producers and the system manager.
2. Production section – IEC will gradually, over a five-year period, sell five sites for production of electric power using natural gas, amounting to a potential output of 4,500 megawatts (representing approximately one-third of the company's production output and a quarter of the overall production output of the market, as of December 2017), on-land sites for the construction of additional production sites (at Rutenberg and at Reading). This year, IEC sold the first power station in Alon, in the Galilee region, and began the process of issuing a tender to sell a second power station, in Ramat Hovav in the Negev region. IEC will not build additional power stations, except for future replacement of four coal-fired electricity production units at the "Orot Rabin" power station in the city of Hadera, with electricity production units powered by natural gas. A subsidiary will be created that will own the new combined-cycle power plants to be built at the "Orot Rabin" site.
3. The transmission section – This will remain entirely under IEC's control since it is a natural monopoly.
4. The distribution section – Because of the advantage of the existing size in the distribution section, this section will remain largely under IEC's control, except for existing licensed distributors, who will be permitted to operate their distribution territories, under the restriction that these distribution licences will not exceed 10% of the annual consumption in the market, accounting for natural growth of consumption in the distribution territories.
5. The supply section – This section will be opened up to competition. IEC will not compete in the supply section for ultra-high voltage, extra-high voltage, and high voltage, but instead will charge according to the rate determined by the Electric Power Authority. In the low-voltage supply section, IEC will be permitted to compete only if its market share in this sector is less than 60%.

Implementation of the reform has begun and has been implemented this year in accordance with the plan, but the process is far from completion.

## **Developments in legislation or regulation**

### Natural gas for transportation

On January 16, 2017, The Natural Gas Commission (appointed by the Government subject to the Natural Gas Sector Law) decided to promote the use of natural gas in Israel as an alternative energy source for transportation. As part of that decision, the regulatory arrangement was set to determine the prices for filling stations that provide compressed natural gas (CNG), emphasising the importance of transmission of the gas to make it available for transportation purposes. This follows a governmental decision of January 13, 2013, which called for transitioning of the Israeli public transportation from petroleum to alternative energy sources by 2025. The decision called for reducing the proportion of petroleum as an energy source for Israeli transport by 30% in 2020 and 60% in 2025, relative to the projected consumption in these years, as long as the transition is economically viable. The Ministry of Energy's official forecast for natural gas use in the transportation sector by different types of vehicles (buses, taxis, trucks, private vehicles etc.), is 1.3 BCM in 2030 and 4.7 BCM in 2040.

### Encouraging renewable energy sources and reducing the use of coal as an energy resource

On April 2, 2017, a governmental decision determined conditions and criteria for authorising independent bodies to create national infrastructure plans for facilities that produce electric power, for submission to the National Infrastructure Committee (the committee was set up in 2002 in Israel with the objective to shorten the planning and approval phases for large and important infrastructure projects). According to the decision, authorisation will be granted to bodies which are interested in building electricity-generating facilities that use natural gas or renewable energy, or electricity storage facilities. Approval of these licensing applications will continue until plans have been approved for the generation of 25,000 megawatts in total, as stipulated, by 2040. Of these, 13,000 megawatts of electricity will be produced via renewable energy sources, including energy storage. This decision goes beyond plans that have already been approved as of the date of decision.

Moreover, on November 12, 2017, the Minister of Energy announced a decision on "Policy Principles regarding the Marginal Operation of Coal-Burning Production Units". According to this decision, electricity generation via natural gas shall be prioritised over coal, with the coal-burning units operating at the minimum levels needed to ensure a reliable, flexible supply of electricity to the Israeli market. The policy will be implemented after ceasing continuous operation of the four coal-burning electricity production units at the "Orot Rabin" power station. Implementation will be subject to the existence of natural gas surplus in the infrastructure linking the three natural gas reservoirs, each of which will have a separate infrastructure for connecting to the national natural gas pipeline system.

Furthermore, on January 2, 2018, the website of the Ministry for Environmental Protection publicised a joint decision by the Minister of Energy and the Minister of Environmental Protection, stating that the IEC would reduce its use of coal for electricity generation by 30% (compared to the base year, 2015), effective immediately. The decision stated that this reduction of coal use would be steeper than the 2017 reduction, which was 20% compared to the base year. The decision also stated that it would bring about a significant reduction in air pollution from coal-burning power plants, and is expected to increase the demand for natural gas. Accordingly, in June–July 2018, governmental decisions about the electric power industry and about structural changes in the IEC were announced; the decisions discussed shutting down the four coal-fired power stations at the "Orot Rabin" facility.

On October 9, 2018, the Ministry of Energy publicised the “Plan for Saving Israel from Polluting Energy Sources”, which set out concrete steps and goals for using natural gas in electricity generation, industry, and public transportation towards 2030. The goals set for 2030 include:

1. In the electric power production sector: that electric power production be divided between natural gas and renewable energy sources at proportions of roughly 80% and 20% respectively, while closing the coal-fired power plants in Hadera and Ashkelon, and ending the use of coal in electric power production.
2. In the industry sector: about 95% of the energy and steam required for industry shall be generated using natural gas.
3. In the transportation sector: a gradual transition to electric cars and natural gas-fuelled trucks, and a strict prohibition on importing cars that run on high-pollution fuels.

### **Judicial decisions, court judgments, results of public enquiries**

Any discussion of the Israeli energy market must reflect the harsh criticism expressed by Israeli environmental non-governmental organisations (NGOs) about the country’s limited use of renewable energy sources. As they see it, Israel is still extremely backward in making use of renewable energy sources to generate electricity – even lagging behind the goals that the Government has set for the State of Israel. At present, renewable energy sources account for 3% of the total electric power produced.

In this context it is important to note that, under its commitment to the Paris Agreement, the Israeli government adopted a national plan, stating the goal of having at least 17% of electric power consumption come from renewable energy sources by the year 2030.

The State of Israel has significant potential to produce electricity from renewable sources, particularly solar energy. Extensive areas of the country, especially in the South, are bathed in sunlight practically year-round. Even in the winter months, those areas receive enough sunlight to produce a large amount of electricity. Distances within the country are relatively small, so electricity from solar power plants can be transmitted to consumers in other regions with relative ease. A large amount of capital is available from pension funds to finance the building and operation of such infrastructure projects, and international stakeholders are relatively enthusiastic about financing this kind of project in Israel – a country with a robust economy and good credit rating. In light of this, environmental organisations are demanding that the government produce much more electric power from solar energy.

Critics blame government ministries for holding back the renewable energy industry – or to be more precise, they point to a lack of cooperation and coordination among the ministries. A wide range of governmental bodies are involved in developing the statutory, administrative, and regulatory infrastructure required to build a power station based that uses renewable energy. To illustrate the complexity of the issue: the Planning Administration of the Interior Ministry has a governmental mandate to identify plots of land suitable for building power stations; the Israel Lands Authority is mandated to issue tenders for allocating the land, and to set the appropriate leasing and improvement fees for using the land; and finally, the Electric Power Authority of the Ministry of Energy is mandated to set the rate that IEC will pay the producers for the electricity produced from renewable sources. This rate must be calibrated such that on the one hand, entrepreneurs will be encouraged to build power stations based on solar and other alternative sources, while sparing the public from paying exorbitantly high prices for electricity.

Despite the slow pace at which Israel has adopted renewable-energy technologies for generating electric power, Electricity Authority officials are optimistic. The Authority's 2018 annual report states that, in spite of the challenges, the Authority estimates that the 2020 goal – having 10% of Israel's electric power generated from renewable energy sources – can be reached. Governmental decisions indicate a positive trend, supporting implementation of the determined goals. It should be noted, however, that due to general elections in 2019, there has been a certain delay in the administration of government processes, on this issue and in general. Acceleration of the government's efforts to support solar-powered electricity production will enable a gradual increase in Israel's clean electricity.

### **Major events or developments**

The vast energy resources discovered in the Mediterranean Sea have significant economic potential as well as potential to strengthen relations between the countries of the region including: Israel, Egypt, Jordan, Turkey, and Cyprus, as well as with the Palestinian Authority. Economic ties in the energy sector may lead to strengthening international relations, given the economic and political benefits that they can confer on all of the participants.

Agreements in the gas sector require long-term contractual relationships, generally for a number of decades, and they involve physical connections between countries via transmission pipelines. Thus, they could strengthen commercial relations and contribute to regional economic stability. Regional cooperation in the sector of gas and energy, which will grow hopefully in the future, can increase the responsible and stabilising factors in the Middle East.

Israel began exporting gas at the end of the fourth quarter of 2016, when it began supplying gas from the "Tamar" reservoir to the Arab-Potash and Jordan Bromine factories on the Jordanian side of the Dead Sea.

In addition, "Leviathan" operators signed a contract in September 2016 with the Jordanian electric company (NEPCO). They contracted to supply a total of approximately 45 BCM over a period of 15 years for producing electric power for the local Jordanian economy. This is a historic export agreement, being the largest gas export agreement signed with the Jordanian kingdom, and also the first signed agreement involving the "Leviathan" reservoir. This agreement is intended to serve as an anchor in the region, both geopolitically and in the energy sector.

In early 2018, the operators of "Tamar" signed an agreement to supply natural gas to the Egyptian firm, Dolphinus Holdings. This agreement is based on the surplus quantities of gas that the "Tamar" operators will have available, for a period of seven years from the time they begin supplying gas. The agreement sets a minimum cumulative supply amount of 5 BCM during the first three years, intended for consumption by the local Egyptian economy. This agreement depends on having infrastructure in place that will allow gas to be transported from "Tamar" to the Egyptians.

Israel is the main supplier of electricity to the Palestinian Authority. However, the Palestinian Authority has begun a process to create the capacity for independent power production, in part by building electric power generating power plants. Operators of "Tamar" and "Leviathan" have reported that they are in contact with various parties regarding the possibility of supplying natural gas to power plants in Gaza and in the area around Jenin.

In parallel, INGL (governmental company) is planning various export projects, including to the Palestinian Authority, as follows:



On October 28, 2018, INGL reported the beginning of negotiations with the Tamar gas consortium regarding the possibility of transmitting natural gas to Egypt via the pipeline infrastructure.

INGL is carrying out planning for a new pipeline segment to connect to a power plant and to additional consumers in the Gaza Strip, as part of a project initiated by several international parties.

The Gas Authority is also progressing plans for a new pipeline section to hook up to a planned power station in Jenin. In April 2017, an agreement was signed between Gas Routes and the entrepreneurial company building the Jenin power station, under which the planning costs for this section will be financed by the entrepreneur.

Furthermore, in December 2017, the Foreign ministers of Israel, Cyprus, Greece, and Italy signed a memorandum of understanding to construct a gas pipeline that will carry natural gas from the “Leviathan” natural gas reservoir to Italy. The planned pipeline is approximately 2,100 kilometres long, and will cost an estimated US\$7 billion. It is expected to be completed in 2025. At the signing of the agreement, the ministers described it as a strategic infrastructure project for managing natural gas that is in the interest of all the countries as well as the European Union. The European Union representative estimated that Europe will need to increase its imports of natural gas by 100 BCM per year because of decreasing gas production from the North Sea, and that Europe views Israel and Cyprus as secure sources of gas supply in the future.

Such projects are undoubtedly of significant economic importance to the energy market, and involve complex national and international legal aspects. As such, as these projects progress, they will likely warrant further attention and discussion in future issues of this journal.

**Dr. Tzipi Iser Itsiq****Tel: +972 3 607 0603 / Email: [tzipi@lipameir.co.il](mailto:tzipi@lipameir.co.il)**

Director of the Environmental Protection, Cleantech and Clean Energy Department in the firm.

Dr. Tzipi is a prime destination for Israel's most active and prominent companies involved in the traditional and renewable energy, desalination, waste treatment, sewage treatment, and other fields, with extensive experience in promoting innovative regulatory reforms in Israel, such as the Clean Air Act in Israel.

Dr. Tzipi also handles a range of commercial, regulatory and continuous issues for clients in Israel, while clients from abroad also tap into her comprehensive grasp of all the environmental issues affecting their major projects across a range of fields.

Dr. Tzipi enjoys a unique role as the former CEO and Legal Counsel of the Israel Union for Environmental Defense (the leading advocacy organisation of the Israeli environmental NGOs) and has been a member of the Israeli delegation to the United Nations Framework Convention on Climate Change (UNFCCC) annual conference, among many other academic and speaking engagements around the world.

Awarded the title of "Woman of Influence" by economic newspapers *Globes* and *The Marker*, and the only female nominee in the Best Environmental Lawyer category in the Euromoney LMG Europe Women in Business Law Awards 2019.

## Lipa Meir & Co.

Amot Investments Tower, 2 Weizmann Street, Tel Aviv 6423902, Israel

Tel: +972 3 607 0603 / URL: [www.lipameir.co.il](http://www.lipameir.co.il)

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