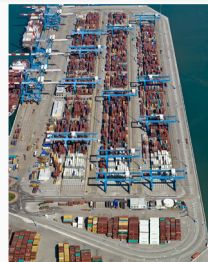
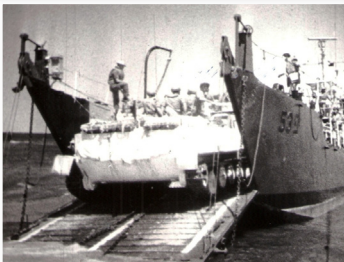


MARITIME STRATEGIC EVALUATION FOR ISRAEL 2019/20

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13. The Energy Sector in Israel: Opportunities and Challenges in the New Decade

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The completion of the Leviathan gas field's development marks the beginning of another important decade for the Israeli energy sector. The decade will be characterized by greater energy security for Israel than the previous one, increased government royalties, and a continuation of the downward trend in air pollution. At the same time, the export possibilities for Israel's gas will remain limited to its bordering neighbors due to the drop in natural gas prices in Europe and due to the Turkish-Cypriot and Israeli-Lebanese disputes surrounding the delineation of maritime borders, which will continue to limit the potential for the development of regional resources. The mutual attacks by Iran and Saudi Arabia on the other's oil assets in the Persian Gulf will create new security risks to the regional oil market, which may also have implications for Israel's oil imports. While increasing the use of renewable energy for electricity production can be part of the solution to these challenges, technological and economic barriers make this an unlikely trend for now. These developments, which are both positive and negative for Israel's energy security, are expected to increase the importance of the Eastern Mediterranean region as a source of energy, as the route for future pipelines, and as a potential market in the coming years

The start of production from Leviathan

The beginning of the new decade is marked by the entry of the Leviathan gas field into Israel's energy sector. Israel's economy will feel the benefits from the field only in about two years. With an initial production capacity of 12 billion cubic meters (BCM) of natural gas per year, the Leviathan field will reinforce Israel's energy security by providing an additional source of natural gas, following a decade in which the economy has been dependent on a single gas field and a single pipeline for all its needs. The new field will also bring long-awaited competition into the domestic gas sector and, together with the development of the Karish and Tanin fields in 2021, a drop in natural gas prices. These benefits will be reflected in the Israeli consumer's electricity bill only in 2022 after the Israeli Electricity Company renegotiates its contract with the owners of the Tamar field. The Leviathan field will also yield larger revenues for the State in the form of royalties, which will be deposited in the Sovereign Wealth Fund, particularly after the implementation of the export contracts with Jordan and Egypt. The ability of the government in the coming decade to use this fund in a responsible and long-term manner, rather than simply for ongoing government expenditures, will be put to the

test in the event that an economic crisis or an insolvent pension system threaten the stability of the Israeli economy and the scope of its social welfare policy.¹

The start of production from the Leviathan field will also lead to reduced use of coal in Israel's electricity production, a trend that will lead to an additional reduction in air pollution. It is worth mentioning that most of the reduction in the use of coal in Israel's fuel mix and the accompanying health benefits were already realized during the past decade (a reduction from 60 percent in 2010 to only 30 percent of Israel's electricity mix in 2018), due to the Tamar field coming online in 2013.² Additionally, the development of the new field also includes certain environmental risks on its own.³ At the same time, it appears that the successful development of the Leviathan field has encouraged the Ministry of Energy to aspire to even loftier environmental goals. It has announced that by 2025 it intends to close all of the coal-fired power plants in Israel, in contrast to the previous policy of leaving enough coal to provide 17 percent of Israel's electricity.⁴ One of the motives behind the Ministry of Energy's sudden decision to accelerate the process stems from its desire to be part of an exclusive club of nations that have declared their complete abandonment of coal in order to mitigate climate change, even though Israel's move will have only a negligible effect on the global effort to reduce greenhouse gas.⁵ On the other hand, the new Ministry of Energy's targets will lead to an almost complete reliance on natural gas for the production of electricity, since renewable energy is not expected to fill the gap within such a short timeframe. This

- 1 For further discussion of the danger in irresponsible use of sovereign wealth funds, see: Humphreys, M. & Sandbu, M. E. (2007) "The Political Economy of Natural Resource Funds", in Humphreys, M., Sachs, J. D. & Stiglitz, J. E. (eds.) *Escaping the Resource Curse*. New York: Columbia Univ. Press.
- 2 The Electricity Authority, Report on the Electricity Sector for 2018, p. 24. https://pua.gov.il/Publications/PressReleases/Pages/doch_mashek_2018.aspx [Hebrew]
- 3 These risks primarily include the emission of pollutants during the production process in a location close to shore. Nonetheless, the Ministry of the Environment has decided that these dangers are negligible if strict environmental rules are obeyed. Ministry of the Environment, "The policy of the Ministry of the Environment on the production of natural gas," December 2018. http://www.sviva.gov.il/subjectsEnv/SeaAndShore/GassOilSea/gas_production_from_leviathan_rig/Pages/moep_general_policy.aspx [Hebrew]
- 4 The Ministry of Energy – press release, "Minister of Energy Steinitz: the end of the coal era in Israel has been reset for 2025 – the timetable for the conversion of the coal-fired plants to natural gas will be shortened," November 2019. https://www.gov.il/he/departments/news/ng_131119 [Hebrew]
- 5 This club, which is led by Canada and Britain, is called the "Powering Past Coal Alliance" and is led by countries that in any case do not use much coal to produce electricity. For the British declaration establishing the club, see: UK Government Press Release, "Climate Change Minister Claire Perry launches Powering Past Coal Alliance at COP23". Department for Business, Energy & Industrial Strategy, November 2017. <https://www.gov.uk/government/news/climate-change-minister-claire-perry-launches-powering-past-coal-alliance-at-cop23>

dependency makes the security of the Tamar and Leviathan fields even more critical since one field cannot quickly compensate for the loss of the other in the event of a malfunction or sabotage in one of them. Therefore, it is likely that the larger power plants will maintain their dual-use ability to quickly convert to coal and/or diesel fuel if necessary, and coal will continue to fulfill an important role as a backup fuel for electricity production in an emergency.

Israel's gas export possibilities remain limited

Despite the successful development of the Leviathan field, the possibilities for the export of Israel's natural gas will remain limited just to its close neighbors for the time being —Jordan, Egypt and the Palestinian Authority.⁶ The main reason for this is the price drop for natural gas in Europe as a result of increased competition and the surplus of liquefied natural gas (LNG) exports coming from the US, Australia and Russia. This competition is expected to keep prices low until the mid-2020s,⁷ a reality that makes it economically unfeasible to construct ambitious undersea pipelines from Israel to Europe (such as the “East Med Pipeline” to Greece and Italy) or new liquefaction facilities in Israel or Cyprus which would cost about \$5 billion. This does not imply that in the future it will not be possible to offer natural gas to Europe at a competitive price, particularly if additional large gas fields are discovered in the region (whether by Israel, Lebanon or Cyprus), but at this stage private investors in Europe are not rushing to invest in the construction of expensive infrastructure to import a relatively small amount of gas from the Eastern Mediterranean at a price that is not competitive. On the other hand, there is a possibility that the EU itself will decide to invest in the construction of a pipeline or in new LNG facilities as part of its effort to diversify away from Russian gas, rather than as a decision based on economic rationale. This investment is liable to be conditional on political demands directed by the EU towards Israel (such as investment in Palestinian infrastructure or showing notable progress in peace negotiations with the Palestinian Authority) and therefore it is likely that this investment will be made only in Cyprus and that a future LNG facility will be located there rather than in Israel.

Adding to these constraints is the fact that even if the gas companies in Israel manage to offer a competitive price to Europe and to attract foreign investment in an expensive undersea pipeline project, their ability to export will be dependent on the

6 On the limited possibilities of export for the gas companies in Israel, see: Elai Retig, “Developments in the Natural Gas Sector in Israel,” in Shaul Chorev (ed.) , *Maritime Strategic Evaluation for Israel 2017/18*, January 2018, pp. 155–162 .

7 Michael Fulwood, “Short- medium- and long-term outlook for LNG,” The Oxford Institute for Energy Studies. November 2019. <https://www.oxfordenergy.org/publications/short-medium-and-long-term-outlook-for-lng/?v=7516fd43adaa>

willingness of the region's countries to cooperate with one another. This condition is particularly challenging in the case of Turkey and Cyprus. During the past year, Turkey demonstrated its resolve to demand a share in Cypriot gas finds by sending warships into Cypriot waters to prevent exploration vessels from operating in the area. At the same time, Turkey began itself to explore in Cypriot waters and declare a new maritime border with Libya despite Cyprus' opposition.⁸ It appears that there will be no way to avoid Turkey's involvement in any offshore infrastructure project that includes Cyprus' exclusive economic zone (EEZ). This will reduce Israel's profit from exporting (or at the very least will limit its control over export destinations) and will require it to collaborate with the Turkish government more closely. Adding to the Turkish-Cypriot conflict is the Israeli-Lebanese dispute surrounding the delineation of a maritime boundary between the two countries. Although this dispute does not prevent the export of gas from the Leviathan field, it may delay additional exploration projects in Lebanese and Israeli waters and may even deter new investors from coming in.

Apart from the problems in exporting to Europe, the gas companies in Israel are also finding it difficult to implement local export contracts, particularly that with Egypt. In 2018, a 10-year export deal was signed between the Tamar and Leviathan owners and the Dolphinus Holding Company in Egypt for 64 BCM of natural gas. At the time of the signing, it was still unclear how the companies would get the full amount of gas to Egypt and it seems that even a year later there is no clear answer to this question. According to the original plan, the direction of the pipeline that previously brought gas from Egypt to Israel by way of the Sinai Peninsula (and which has been unused since 2011 due to repeated and deliberate sabotage) would be reversed. However, there are serious capacity constraints on the gas pipelines in Israel that are meant to feed into this pipeline during periods of peak seasonal demand for gas in Israel. Therefore, it is unclear whether the owners of Tamar and Leviathan will manage to provide the full quantity specified in the contract. In addition, the security threats in Sinai have still not been dealt with and this places the reliability of the proposed supply line in question. Having said that, the Egyptian government is now the owner of the pipeline (rather than a private company as in 2011), which gives it greater immunity.

These challenges will force the gas companies to invest more effort in competing over the domestic market in Israel, particularly after the Karish and Tanin fields come online in late 2021, and to ensure exports to Jordan as the main anchor for Leviathan, despite the opposition on the Jordanian street. These trends are not necessarily negative.

8 Michele Kambas, "Tensions grow as Cyprus says Turkish drilling ship violates its rights," Reuters. October 4, 2019. <https://www.reuters.com/article/us-cyprus-turkey-ship/tensions-grow-as-cyprus-says-turkish-drilling-ship-violates-its-rights-idUSKBN1WJ0HQ>

If Israel intends to completely tie the fate of its electricity sector to the availability of natural gas, then the urge to export gas to more distant destinations will have to be restrained. Exporting to Europe or Asia will perhaps provide temporary profits for the State, but in the long term Israel's energy sector is liable to find itself without sufficient energy sources if the technology that is meant to replace natural gas in the future (mainly solar) does not live up to its promise. .

Energy independence and the global oil market

Israel does not enjoy “energy independence” nor is it likely to experience it anytime soon. The reason being that natural gas is not an alternative to oil but only to coal in the production of electricity and heat. Israel currently imports about 250,000 barrels of oil per day, which is similar to the amount it imported a decade ago. Overall, oil constitutes about 40 percent of its total fuel consumption.⁹ The introduction of electric vehicles into the Israeli market, which is not expected in the immediate future due to various barriers,¹⁰ will not have a major effect on the demand for oil since private vehicles are not the main source of that demand. At the top of the list are planes, ships, trucks and petrochemical plants, and of course Israel's military.

Therefore, Israel devotes major efforts to ensure the availability of reliable and affordable supplies of oil, which arrive by sea. Israel's main oil suppliers are Azerbaijan and Russia, as well as Kazakhstan. Israel sometimes acquires oil from the Kurdish autonomous area in northern Iraq when this is possible. While Israel has a relatively diverse set of suppliers, almost all of its oil is transported through Turkey, whether by way of the BTC pipeline from Azerbaijan to the Turkish port city of Ceyhan, or through the Bosphorus Strait. Israel refines the oil it receives at the Bazan refineries in Haifa and exports some of the output back to Turkey. This trade has remained stable over the years despite the various political upheavals.

Although Israel has enjoyed a secure supply of oil throughout the past decade, recent developments in the Persian Gulf are threatening this status quo. A series of attacks and mutual sabotage operations between Iran and Saudi Arabia in the Persian Gulf reached a peak on September 14th, 2019 when the oil refineries at Abqaiq in Saudi Arabia, which are the most important in the world, were attacked by Iranian drones. The attack temporarily cut Saudi oil production in half, which translates into a 6 percent reduction in global oil production (about 5.7 million barrels). The attack on Saudi

9 U.S. Energy Information Administration, “Israel – Overview”. <https://www.eia.gov/beta/international/analysis.php?iso=ISR>

10 Dubi Ben Gedaliah, “The electric car is gaining momentum worldwide – why not in Israel?” *Globes*. October 28, 2019. <https://www.globes.co.il/news/article.aspx?did=1001304822> [Hebrew]

Arabia is an indication of the current resilience of the oil market, considering how the unprecedented disruption in supply had almost no effect on world oil prices. On the other hand, the attack also demonstrated the possible fragility of the market, with oil facilities again becoming a legitimate target in regional conflicts, as occurred during the 1980s in the context of the Iran-Iraq war. Accordingly, the price of insuring oil tankers that travel through the Persian Gulf has skyrocketed. In addition, as investment in new oil exploration continues to be low around the world and global oil supply declines, the chance has increased that a similar attack in the future will be felt much more.

The attacks in the Persian Gulf have had only an indirect effect on Israel since the oil from the Gulf is destined primarily for East Asia. Nonetheless, oil prices are set globally and to the extent that there is a shortage on one side of the world, the price will increase for everyone, including Israel. Secondly, the direct involvement of Turkey in Syria as part of its military campaign against the Kurds on its southern border increases the potential for friction between Turkey and Iran on Syrian soil, something that is liable to lead to the sabotage of Turkish infrastructures (both by the Kurds and the Iranians), including oil pipelines that traverse Turkey on their way to the Mediterranean.¹¹ In the event of sabotage of the pipelines or a blockade of the Bosphorus Strait, Israel will experience an immediate and urgent shortage of oil. Therefore, maintaining Israel's sources of oil, all of which arrives by sea, is as important as the security of the natural gas facilities in Israel's economic waters.

Renewable energy

Renewable energy may have a role to play in Israel's response to the expected challenges to its energy sector in the coming decade. First, the production of electricity from sources other than natural gas will help diversify its fuel mix and reduce its dependency on natural gas, while adding to the country's energy independence. Second, the reduction in domestic demand for natural gas will release more supply for export, which will make exporting more worthwhile and will increase the State's royalties. Third, the diversification of Israel's sources of energy production will reduce the sector's exposure to sabotage, missile attacks and various technical breakdowns and will allow for larger-scale entry of private electricity producers (including households who can produce electricity by means of PV solar panels on their roofs, which will reduce the pressure on the Israel Electricity Company in peak periods of demand). Fourth, the shift to renewable energy will reduce air pollution and greenhouse gas

11 There have been attacks on Turkey's oil pipelines in the past, so this is not a new phenomenon. In 2008, a Turkish oil pipeline blew up (apparently as the result of a cyber attack) and similarly the oil pipeline from Kirkuk to Ceyhan has been sabotaged periodically. The main danger arises from the scale and sophistication of the sabotage if Iran becomes involved.

emissions which result from the production and burning of natural gas, although the extent of this reduction is not sufficient to justify a transition to renewables on its own. Accordingly, the Minister of Energy, Dr. Yuval Steinitz, has proposed to set a new target for the introduction of renewable energy in Israel's electricity sector – from 6.5 percent currently to 30 percent by 2030.¹²

While the Energy Minister's decision to increase the share of renewables in Israel's electricity sector was met with public criticism for not being ambitious enough, it is actually overly ambitious. Apparently the new target is based on that of the European Environment Agency (EEA) which set a target of 32 percent by 2030.¹³ However, most of the renewable energy in Europe is produced by three sources that are not relevant to Israel: hydroelectric (Israel lacks the required rivers), wind (which is sufficient only in small areas in the Golan Heights) and the burning of wood (which the EU considers to be clean renewable energy, despite numerous studies that contradict this position). In contrast, Israel's renewable energy potential is primarily limited to solar. So far, no country is able to produce 30 percent of its electricity from solar energy, due to the many technological constraints it contains. In the current situation, there is no economic logic for Israel to commit to such a massive and unprecedented transition into solar energy before the technologies for storage (batteries) and the cost efficiency of the solar panels relative to their price and the surface they take up justify such a commitment. Israel has twice demonstrated during its short history the ability to quickly convert its energy sector, as long as the technology exists.¹⁴ In the mid-1970s, as a result of the OPEC oil embargo and the increase in oil prices, Israel decided to convert its power plants from diesel to coal and in less than a decade went from 100 percent dependence on diesel to 80 percent dependency on coal. Furthermore, during the past decade Israel shifted its energy sector from coal to natural gas within a short timeframe. Once solar technologies are further developed, Israel will be able to shift relatively quickly. Although the transition of electricity production from one fossil fuel to another is much less complicated than the transition to solar or wind energy (due to the lack of continuity that characterizes this energy and the need to construct a more advanced electricity grid), Israel's energy sector is small and closed-off (both

12 Ministry of Energy – press release, “Minister of Energy Steinitz's initiative: A new target for the production of electricity from renewable energy for 2030 will be 25-30 percent,” November 2019. https://www.gov.il/he/departments/news/re_171119 [Hebrew]

13 European Environment Agency, “Renewable energy in Europe – 2018”, EEA Report No 20/2018. <https://www.eea.europa.eu/publications/renewable-energy-in-europe-2018>

14 In contrast, the unfortunate case of the “Better Place” company illustrates what happens when a new and promising technology is introduced into a small market before it has fully matured.

geographically and demographically) and blessed with sunshine, such that the change can be accomplished within a decade.

Conclusions

The trends described above are expected to increase the importance of the Eastern Mediterranean for Israeli energy security in the near future: 1) The higher expected dependence of Israel's electricity sector on natural gas as a result of the closing of coal-fired plants increases the need to protect Israel's maritime domain and the resources found in it. Renewable energy can reduce this dependency in the future but various technological and geographic constraints will slow down its introduction in the coming decade. 2) Numerous political and economic barriers require the gas companies to invest most of their efforts in the development of the regional gas market (Israel, Jordan, Egypt, the Palestinian Authority and perhaps in the future also Lebanon) rather than the search for more distant export markets in Europe and Asia. This preference will lead to, among other things, the laying of additional undersea pipelines in Israel's sovereign waters, particularly between Israel and Egypt, as an alternative or a supplement to the land pipeline in Sinai, which is liable to constitute a target for recurring sabotage. 3) The conflicts between Cyprus and Turkey and between Israel and Lebanon surrounding its maritime boundaries and the granting of exploration licenses increase the potential for friction between various forces in the Eastern Mediterranean. If the countries in the region wish to attract international energy companies and to develop their common resources, they must adopt a different approach that encourages cooperation and the sharing of profit. 4) Security threats to the stability of the oil market and the main routes of supply, particularly in the Persian Gulf, require that Israel reexamine its supply routes and search for alternative sea routes for the import of its oil, in the event that the Turkish route is temporarily disrupted.