

# MARITIME STRATEGIC EVALUATION FOR ISRAEL 2017/18

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## Economic challenges to natural gas exports from Israel's maritime gas fields

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In the coming years, global gas markets are expected to become more competitive and saturated, particularly in Europe. This trend will make it more difficult for gas companies in Israel to find new export markets for their product, beyond Israel's immediate neighbors. At the same time, a number of attractive destinations still remain for selling Israeli gas in the region, though the companies must find a way to lower their prices in order to stay competitive. This reality limits the companies' profit potential (and accordingly, the state's royalties from export), and decreases the feasibility of ambitious export projects, such as the underwater "EastMed" pipeline to Greece and Italy. Adding to these troubles is the current saturation of the local Israeli gas market, a fact that serves to deter new energy companies from exploring Israeli waters.

This chapter first presents the expected trends in the gas markets of Europe and the Middle East up to the year 2022. Afterwards, it examines the export options available to the gas companies in Israel, with a focus on the economic feasibility of each option. Finally, the chapter examines the difficulties in attracting new energy exploration companies to the Israeli market, and emphasizes the need to increase demand for local gas in Israel through deregulation and infrastructure expansion.

### Trends in the natural gas markets of Europe and the Middle East

According to recent forecasts by the International Energy Agency (IEA), the natural gas market in Europe is expected to be saturated and highly competitive at the start of the next decade.<sup>1</sup> While the general global consumption of natural gas will grow by some 10% by 2020, demand on the European continent will remain at the same level and may even drop, from 462 billion cubic meters (BCM) in 2016, to 458 BCM in 2022.<sup>2</sup> Despite the drop, European demand for imported natural gas will actually grow during these years, mainly due to the decrease in local gas production (particularly in the Netherlands).

Growing European demand for gas is expected to produce many competitors. These include current liquefied natural gas (LNG) suppliers who are forced to compete in a saturated global market and are looking to penetrate new markets (especially the US and Australia), as well as suppliers of dry gas via pipeline from the Caspian Sea (the "Southern Corridor") and from Russia ("Nord Stream 2"). On the eastern front, Russia

1 International Energy Agency, "Gas 2017: Analysis and Forecasts to 2022". Market Report Series, 2017. <http://www.iea.org/Textbase/npsum/gas2017MRSsum.pdf>

2 Most of the growth in the global consumption will come from developing countries, led by China and India, and mainly for the industrial sector (including chemicals, fertilizers), and not from the electric or transportation sectors. Consumption in Europe is expected to drop due to energy efficiency and greater use of renewable energy among European Union members.

has already reduced the price of gas for several of its east European customers, and is showing greater flexibility in its long-term contracts in order to safeguard its dominance in the area.

Following these processes, gas prices in Europe dropped in recent years, and are expected to remain low for at least the coming five years (despite a short rise in the beginning of 2018). This will make it difficult for gas companies in Israel to offer attractive prices to the continent. In 2016, the average price for dry gas in Europe stood at \$4.98 per heat unit (MMBtu),<sup>3</sup> a drop of 28.2% compared to 2015.<sup>4</sup> LNG prices in 2016 stood at \$4.78 per MMBtu, compared to \$11 in 2013 (lower than the price of dry gas, but does not include the cost of regasification). These prices are significantly lower than those offered by Israeli gas companies to nearby markets, even without taking into account added transport costs from the East Mediterranean to the European continent. For example, the Israel Electric Corporation (IEC) paid in 2017 \$5.8 per MMBtu for natural gas from the Tamar field, while Jordan is expected to pay \$6.2 per MMBtu for gas from the Leviathan field following a supply deal signed in September 2016.<sup>5</sup>

Compared to Europe, demand for natural gas in the Middle East is expected to grow significantly in the next few years, particularly in the electricity sector. However, most of this growth will be met through local production rather than imports. The IEA estimates that in 2016, the Middle East consumed 471 BCM. In 2022, this number will reach 542 BCM (an increase of 15%). This number can rise or fall in response to various national economic reforms in the region, including the construction of better regional infrastructure for the production and transport of gas. This is particularly true in Iran (which will be responsible for half of the rise in gas demand) and in Egypt. Both of these countries can meet the rising domestic demand with their own resources, provided they properly invest in such efforts.

Turkey is the exception, since its growing demand for natural gas will be met primarily by external suppliers. However, this growth is expected to be lower than previously assumed. In 2016, the Turkish market consumed less than it did in the previous year – 46 BCM compared to 48.8 BCM – representing the first drop in gas demand since 2009. The Oxford Institute for Energy Studies recently forecasted that gas demand in Turkey will only reach 62 BCM by 2030, a drop of 25% compared to the original estimate of 81

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3 BTU stands for British Thermal Unit – these indicate a measuring unit for heat and energy needed to heat one pound of water (around 0.45 kilogram) by 1 degree Fahrenheit (0.56 degrees Celsius).

4 International Energy Agency, *Natural Gas Information 2017*. <https://www.iea.org/publications/freepublications/publication/NaturalGasInformation2017Overview.pdf>

5 Lior Gutman, "A huge contract: The Leviathan cooperation will supply gas to Jordan worth 10 billion dollars," *Calcalist*, September 26, 2016. <https://www.calcalist.co.il/markets/articles/0.7340.L-3698842.00.html>

BCM made by the Turkish state-owned energy company.<sup>6</sup> The reason for this steep drop in demand forecasts lies in the Turkish government's new policy of reducing dependency on external gas suppliers through increased consumption of local coal, and through the hastened development of renewable energy and nuclear power plants.

The global liquid gas market is also not expected to be particularly attractive for Israeli gas companies, at least not in the short-term. LNG markets will continue to be saturated and competitive in the coming years, despite an increase in global consumption. The introduction of the US as a major LNG exporter alongside Qatar and Australia is the most significant element in this trend. Russia too will increase its liquid gas export volumes, particularly from Siberia and the Yamal Peninsula, following a drop in the demand for dry gas to Europe.

In order to find more markets for liquid gas, an effort is being made in recent years to develop cheaper and more efficient regasification technologies, such as offshore LNG reception facilities. This is designed to encourage more countries to set up their own expensive facilities for receiving liquid gas. At the end of 2016, the number of countries owning a regasification facility stood at 39, compared to just 15 in 2005. Despite this positive trend, the increase in demand is still not expected to be sufficient to balance the market. Thus, for example, the demand for liquid gas in Japan, the largest consumer of liquid gas in the world, will decrease in the coming years, as more of its nuclear power plants go back online. Though demand for the product is increasing in China, liquid gas exporters are still struggling to find new markets.

## Economic difficulties in implementing export infrastructure

Despite the bleak forecast for the global gas market, gas companies in Israel still have a number of export options. These however require very different levels of financial investment in infrastructure.<sup>7</sup> The cheapest option is to export dry gas via pipeline to neighboring states, namely Jordan and Egypt. The pipeline to Jordan forms part of the export agreement already signed by the owners of Leviathan in September 2016. The pipeline's route will pass north of Bet She'an, and will also transfer gas to the Palestinian

6 Gulmira Rzayeva, "Turkey's gas demand decline: reasons and consequences", *Energy Insight 11*, Oxford Institute for Energy Studies (April 2017). <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2017/04/Turkeys-gas-demand-decline-reasons-and-consequences-OIES-Energy-Insight.pdf>

7 For full details regarding Israel's export options and their geopolitical implications, see the chapter on natural gas in the HMS strategic assessment for 2016: Elai Rettig and Eyal Hayut-Man, "The Geopolitical Aspects of Gas Reserves in the Economic Waters of Israel", in Shaul Chorev (ed.), *Maritime Strategic Evaluation for Israel 2016*. Haifa Research Center for Maritime Strategy (April 2017). pp. 130-141. [http://poli.haifa.ac.il/~hms/images/publications/EN\\_Report/\\_EN\\_Report\\_.pdf](http://poli.haifa.ac.il/~hms/images/publications/EN_Report/_EN_Report_.pdf)

Authority via the city of Jenin. The cost of the Israeli segment of the pipeline is estimated at approximately 70 million dollars.<sup>8</sup>

The pipeline is expected to allow gas to flow at quantities three times larger than what the current deal with Jordan calls for. This signals an intent to significantly increase the volume of gas exports to Jordan and to the Palestinian Authority in the future. It is important to note that the Jordanian street oppose the gas deal with Israel. The Jordanian government has therefore stressed the fact that the deal was signed between two private companies, and not between the two governments. However, the Israeli government's involvement in the project is clear, both in the guarantees it provided for the two sides and in the funding of the pipeline's Israeli section.

The export of gas to Egypt is also considered a relatively cheap option. What remains unclear is the extent to which the local Egyptian market actually needs Israeli gas. In terms of infrastructure, the dormant gas pipeline between the countries, owned by EMG, can technically reverse its direction, although the costs involved in such a conversion have not been publicized. Another cheap option is to build a 100km land pipeline from Israel to Egypt that will run south of the Gaza Strip. This could link the gas pipeline in southern Israel to the Egyptian gas pipeline in the Sinai Peninsula, possibly via Kerem Shalom area. This option would provide Israel not only with access to the Arab Gas Pipeline that continues north to Jordan (and from there to Lebanon and Syria), but also, to some extent, it would connect between Israeli and Egyptian gas infrastructure, allowing the creation of mutual redundancy between the countries in case of a sudden shortage. Security considerations in the Sinai Peninsula, however, remain a concern for both options. Beyond these linkages, there are also safer yet more expensive sea-based options, which include an underwater pipeline directly from the Tamar field to Egypt, which would be 300 kilometers long. The owners of Tamar assessed that the cost of the project would be around \$1.52 billion, based on the assumption that they will fund only the section that reaches the maritime border with Egypt, at a cost of \$0.7-1 billion.<sup>9</sup>

However, it is still too soon to determine how much gas the Egyptian market will indeed require from Israel. In November 2017, the Egyptian oil minister, Tarek El-Molla, announced that Egypt plans to stop importing LNG in 2018, and instead rely on the production of gas from the giant Zohr field that was discovered in its waters in 2015.<sup>10</sup> Yet this does not necessarily prove a lack of an intention to also import dry gas from Israel,

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8 Avi Bar-Eli and Eran Azran, "The owners of Leviathan gave up on billions – and the gas export agreement to Jordan was signed," *The Marker*, September 26, 2016. <https://www.themarker.com/dynamo/1.3079574>

9 Avi Bar-Eli, "The price of the gas compromise: The state will pay 300 million dollars for the pipeline, and a discount of billions in tax to the companies." *The Market*, July 6, 2015. <https://www.themarker.com/dynamo/1.2676855>

10 Eran Azran, "Gas stocks are plummeting: Egypt plans to stop importing gas in 2018 – and could export in 2019," *The Market*, November 15, 2017. <https://www.themarker.com/markets/1.4605299>

since that is a cheaper and more stable option over the long run, compared to liquid gas. In any case, it is reasonable to assume that any exports to Egypt will not only be for local market needs, but rather, and perhaps mainly, to revitalize its underutilized LNG facilities for export to Europe.

Compared to Egypt and Jordan, exports of Israeli gas to the Cypriot market is not a particularly attractive economic option. This is due to the high cost of transferring gas from the Leviathan field (or from Tamar) to Cyprus (up to \$2 billion), compared to the small gas market that Cyprus can offer. This option would only be possible if it is part of a larger joint development project that includes the Aphrodite gas field in Cypriot territory, and only if Cyprus will just be used as a stopping point en-route to other markets. This could be accomplished either through an LNG facility that would have to be set up on the island, or through a pipeline that will continue onwards to Turkey and Europe. Both options are expensive and present political challenges as well, making them less likely to materialize.

As previously mentioned, another option for Israeli gas exports is their conversion to LNG. This option is economically logical only if it is carried out through the existing liquefaction facilities in Egypt. The increasingly competitive LNG market rules out the economic logic of setting up a new facility on Israeli or even Cypriot territory which would cost anywhere between \$5 to \$10 billion. Competitively priced LNG would only be possible if the gas companies use the existing liquefaction facilities in Idku and Damietta in Egypt, which are only partially active due to a shortage in local gas. This possibility received a boost in August 2017, following a new law that was signed by the Egyptian president, allowing the Egyptian private sector to import natural gas independently through state-owned infrastructure.<sup>11</sup>

At the same time, the option of exporting gas to Damietta is becoming more distant. In December 2016, Egypt announced that it gave ENI approval to export up to 7.5 BCM via Damietta, which is the maximum possible capacity of the facility.<sup>12</sup> The gas will apparently arrive from the massive Zohr field, and maybe from the new Baltim Southwest field that was discovered by ENI in June 2016. In comparison, the facilities at Idku have a larger annual capacity (11 BCM) and are still not fully exploited, even after Royal Dutch Shell (which acquired BG) received approval to use the facilities on January 2017.<sup>13</sup> If the

11 Eran Azran, "Is Egypt on the way to purchasing gas from Israel? Cairo gave approval to private businesses to import gas," *The Market*, August 8, 2017. <https://www.themarket.com/markets/1.4335835>

12 Avi Bar-Eli, "A blow to the Tamar monopoly: Egypt will permit gas exports – at Israel's expense," *The Market*, December 18, 2016. <https://www.themarket.com/dynamo/1.3163873>

13 Eran Azran, "Has the export of gas to Egypt died? Cairo approves liquid gas exports – this time, at the expense of Leviathan," *The Market*, January 5, 2017. <https://www.themarket.com/markets/oil-and-gas-exploration/1.3220388>

owners of Leviathan are interested in taking part in the liquid gas market, the facilities at Ildku represent the most tangible option, at least in the next five years.

The final (and most expensive) option for the export of Israeli gas includes long underwater pipelines to Turkey and/or Greece and Italy. While there are significant challenges to the feasibility of both pipelines, it seems that the Turkish option is much more economically realistic. The option of a pipeline to Turkey was raised a number of times over the years, with cost estimates of between \$2 to \$3 billion.<sup>14</sup> The pipeline would transfer 8 to 10 BCM annually from the Leviathan field to the Ceyhan Port in southern Turkey and could be completed within four years. The gas would supply the growing demand in the Turkish market, which is currently met mainly by Russian, Iranian, and Azerbaijani gas, at an average cost of \$5.2 per MMBtu (as of the first half of 2016).<sup>15</sup> Gas companies in Israel will apparently not be able to offer a price that is cheaper than the current average that Turkey is paying. However, Israeli gas supplies offer other benefits to the Turkish market that can make up for the higher cost, such as credibility and diversification of supply.

There is also an option of using Turkey as a transit country to sell gas to the European continent. For this purpose, Israel does not need to directly link up with the new "Southern Corridor" pipeline leading gas to Eastern Europe. It is more likely that any such transaction will be carried out through a swap deal, in which Israeli gas flowing to the Turkish market frees up other gas for export to Europe.

Even so, the main obstacle to a transaction with Turkey is political. Relations between Turkey and Israel have been particularly unstable in recent years, and so were Turkey's relations with all the rest of its regional neighbors. The frozen conflict in Cyprus serves as another obstacle to any large-scale regional export projects. Even political stability within Turkey itself could undermine the confidence of private investors in any long-term transactions.

A second ambitious option is to lay a pipeline from Israel to Italy via Cyprus and Greece. This may be feasible in terms of engineering capabilities, but the economic feasibility of the project is in serious doubt. The cost of this pipeline, dubbed the East-Med Pipeline, stands at \$6.7 billion, and it would be placed at a depth of two kilometers, passing three thousand kilometers on its way to Italy. It would transfer an annual quantity of 8–16

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14 The upper price estimate was made at the start of 2014, when the prices of oil and gas were significantly higher than in 2017, as well as the costs of setting up their transport infrastructure. Since then, prices across the industry dropped, and it is likely that the project's costs have dropped too. Hedy Cohen, "Gas execs see Israel-Turkey gas deal by 2017", *Globes*, 28 June, 2016. <http://www.globes.co.il/en/article-gas-execs-see-israel-turkey-gas-deal-by-2017-1001135479>

15 This is the average cost for the three suppliers, with Russia supplying the cheapest gas and Iran supplying the most expensive gas. For more details, see: Austvik, Ole Gunnar, and Gulmira Rzayeva. "Turkey in the Geopolitics of Natural Gas", *Harvard M-RCBG Associate Working Paper Series* 66. September 2016. [https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/files/66\\_final.pdf](https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/files/66_final.pdf)

BCM of gas to Europe. Israel and Cyprus are both interested in a pipeline to Italy as an alternative, and even as an addition, to the Turkey pipeline option. Indeed, in the past year there appeared to be a high level of political willingness to promote the project. Examples include a meeting between the prime ministers of Israel, Greece, and Cyprus in June 2017, and a joint declaration that the pipeline can be built by 2025.<sup>16</sup>

Yet despite the clear political will in place, the economic viability of this initiative is unclear, and this is the determining factor. According to initial estimates, the cost of gas offered by the Leviathan field to Europe will range from \$6 to \$8 per MMBtu in order to make the project profitable, compared to the average of \$4.98 paid by European customers.<sup>17</sup> The high asking price is the direct result of the high costs associated with the pipeline. To this, one must add the many engineering challenges that arise from laying the pipeline in such deep waters, over such a long distance, and through terrain that is not ideal in certain sections. These factors may substantially push up the final cost of the project. In general, projects of this kind tend to stray much beyond their initial budgets. A research conducted by Ernst & Young in 2014 found that two thirds of the current hydrocarbon megaprojects in the world strayed beyond their estimated initial costs in a significant margin.<sup>18</sup>

Even if the ambitious pipeline project proceeded according to plan, the asking price for the gas will still be higher than the expected average cost in the European market in the coming years. The European Union is discussing the possibility of consumers paying an "energy security" tax for any volumes of natural gas that do not come from Russia, a category that includes liquid and dry gas from the Mediterranean. However, this suggestion contradicts the EU's principle of free competition, which prohibits discriminatory taxes on goods and services providers. In the past, the US government supported the East-Med pipeline project, but the current Trump Administration is more concerned about promoting US energy exports, such as liquid gas to Europe. Simultaneously, Europe is making progress in renewable energies, which could significantly reduce its need for more big investments in gas import projects from the Mediterranean. As a result, the chances of this project taking off are not high. Having said that, the discovery of additional large gas reserves in the waters of Israel, Egypt, Lebanon, or Cyprus could change the equation in favor of the project.

16 Karolina Tagaris, "Greece, Israel, Cyprus to speed up Mediterranean pipeline efforts", *Reuters*, June 16, 2017. <https://www.reuters.com/article/us-greece-israel-natgas/greece-israel-cyprus-to-speed-up-mediterranean-pipeline-efforts-idUSKBN1962XK>

17 Abboud Zahr, "Challenges of an East Med pipeline", *Cyprus Mail*, 2 July 2017. <http://cyprus-mail.com/2017/07/02/challenges-east-med-pipeline/>

18 Olaniran, O. J., Love, P. E. D., Edwards, D., Olatunji, O. A., & Matthews, J. (2015). Cost overruns in hydrocarbon megaprojects: a critical review and implications for research. *Project Management Journal*, 46(6), 126–138. <http://dx.doi.org/10.1002/pmj.21556>



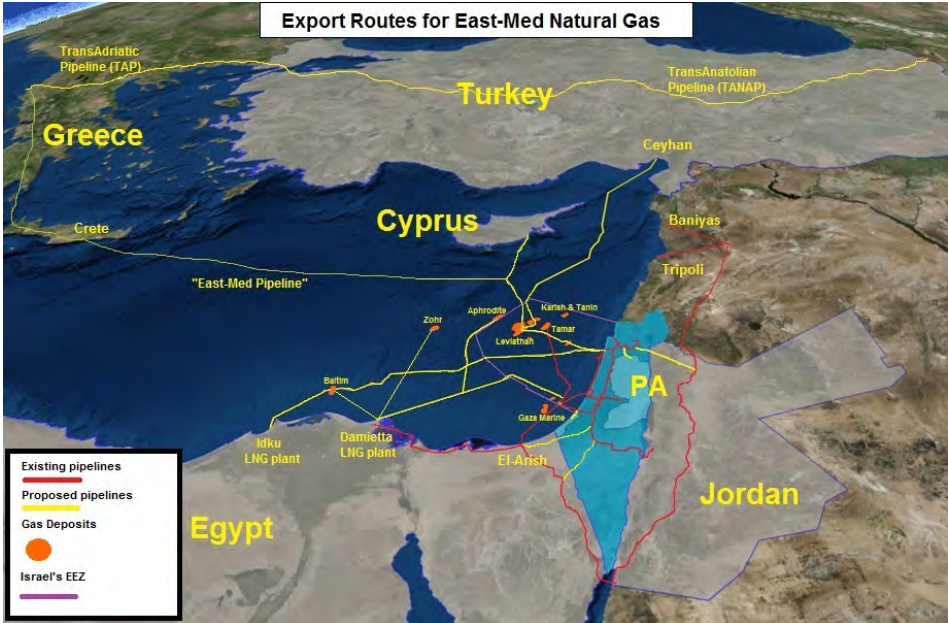


Figure 1 – Export Routes for East-Med Natural Gas

## Difficulties in attracting more foreign energy companies to Israel

Another consequence of the current gas market is the difficulty in attracting new entrepreneurs and energy companies to conduct more explorations in Israeli waters. In November 2016, the Ministry of Energy released an international tender, marketing 24 blocs (sea areas encompassing up to 400 square kilometers) that was supposed to be completed by April 2017. The tender was postponed twice (to July and November), following the very weak response on the part of international companies.<sup>19</sup> In the end, just two offers were made – one by Energean, which was primarily concerned with capturing the area between its Karish and Tanin reserves so that another company will not do so instead, and a second offer by an Indian consortium which includes Bharat PetroResources (BPRL), ONGC Videsh, and Oil India.<sup>20</sup>

19 Out of four companies, the Spanish Repsol company announced its withdrawal, the Israeli Shapir company lacks experience in the field, and Italy's Edison company represents a certain political challenge due to its close ties to the Russian government. Avi Bar-Eli, "We know we wouldn't be flooded with requests for drills, but at least our image improved," *The Marker*, June 27, 2017. <http://www.themarker.com/dynamo/1.4210913>

20 Ora Koren, "The Greek Energean and an Indian consortium submitted offers for gas and oil searches in Israeli waters," *The Marker*, November 15, 2017. <https://www.themarker.com/news/macro/1.4605687>

The main concern of those interested in entering Israeli waters is the lack of a clear destination for the marketing their gas, given the current gas prices. Unlike Egypt, the Israeli market is fully saturated, and has no room for a gas supplier beyond the partnerships controlling Tamar, Leviathan, and Karish-Tanin.<sup>21</sup> Locating an external market is the only option that exists at this stage for any new company, but this is a complex challenge, due to the expected market conditions. Adding to this challenge is the fact that gas markets close to Israel are already taken. Jordan signed a gas supply contract with the Leviathan field, which will supply most of its needs, and it has no political will to become even more dependent on gas from Israel. Egypt is enjoying a number of significant gas discoveries in its territory for local market needs, and its LNG facilities will not wait for a new competitor in the Israeli market beyond the Tamar and Leviathan fields. Although new fields could contribute to the likelihood of building a pipeline to Italy, this is still a risk which, taken on its own, is insufficient to attract significant financial investment in new exploration projects. As a result, a new energy company that enters Israel will have to assume that it will take at least ten years before there will be sufficient infrastructure and markets for its gas. Few companies would agree to that deal, especially in light of the security costs and the geopolitical risks that are involved in exploring in Israeli waters.

Perhaps the main problem of the Israeli market stems from its weak local demand for natural gas, which is not growing as expected. This is despite the great economic and environmental potential involved in turning Israel into a gas-based economy. Reasons for this include excess regulation, which makes it difficult to connect factories in Israel to natural gas, delays in promoting infrastructure projects for the distribution of gas to residential homes, and a lack of success in introducing natural gas in the transportation sector.

In this respect, it is possible that the political enthusiasm surrounding the prospects of exporting natural gas somewhat diverted the Israeli government's attention from the local economy. Insufficient attention is given to maximizing the domestic market's potential through legislation, decreased regulation, and funding of authorities that encourage the development and introduction of gas-based technologies. Nevertheless, when it comes to transportation, there is little the state can do. Private vehicles fuelled by natural gas cannot compete with electric cars as the 'vehicle of the future,' and this makes any investment in a technology whose replacement is already on the horizon superfluous. Still, it is possible to introduce gas technology in large vehicles like buses and trucks, areas where electric technology is making less progress due to limitations on electricity storage capacity (the size and weight of batteries). It is important to note that even if the Ministries for Transportation and Energy succeeded in introducing natural gas into large vehicles in Israel, this would not increase gas demand very dramatically (approximately

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21 Lebanon also does not offer an especially attractive market for exploration companies, but it does offer better regulatory and political conditions than those that exist in Israel, especially due to its good connections with the French government and Total.

10% increase, according to various estimates). However, when such a step is combined with other initiatives in other sectors it may create a change.

In light of the trends in the regional gas market for the coming five years, and without significant development of the Israeli gas market, the options for existing gas companies remain limited in the short-term, and the potential to attract new companies to Israel is small.

### **Summary and recommendations**

In light of expected market conditions, the Israeli government and the gas companies operating in Israel should focus most of their efforts on developing the local and regional gas market, and prioritize this over searching for distant export markets. It seems that the big hopes for geopolitical benefits have diverted attention, to some extent, away from the principal advantages introduced by the natural gas found in Israeli waters: (1) Increasing Israel's energy supply security and that of its immediate neighbors, (2) decreasing energy costs compared to imports from external sources, and (3) significantly decreasing air pollution in the region.

These advantages will grow so long as the demand for natural gas grows in the Israeli economy as well as in the Jordanian and Palestinian economies. Israel should thus encourage the introduction of gas to new sectors in the economy (agriculture, transportation, residential homes) by introducing economic incentives and especially by lifting burdensome regulation on existing sectors, making it easier for them to link themselves to gas.

One should also take into account that the more the local Israeli economy becomes dependent on natural gas, the more important it will be to properly secure a continuous, regular, and error-free gas supply to Israel's coastlines. To that end, the government should strive to create redundancy in its supply lines. This can be achieved through the construction of an additional pipeline to the coastline from the Tamar field, and through the quick development of the Leviathan, Karish, and Tanin reserves. Without this redundancy, even a relatively short-term, periodic, technical fault (like the one that occurred in October 2017) could, in the future, paralyze Israel's electricity market and industries.