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The Security of the Israeli Electricity Sector During the Israel-Hamas War

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EXECUTIVE SUMMARY: The war in Gaza has revealed serious weaknesses in the Israeli electricity sector that do not have an immediate solution, and there is no unanimity on the extent of the damage that will be caused if the war in the north expands. Extreme scenarios range from several hours to several days without electricity in the major cities and the center of the country and several weeks of such conditions in the border areas. These scenarios would require the Israeli citizen, who is not used to power outages, to be calm and patient. In the long term, the security of the Israeli electricity sector will require the installation of expensive infrastructures and a significant easing of regulations that will take years to implement and require direct government support. These moves include the search for additional gas fields and the construction of backup gas pipelines, greater decentralization of the electricity sector through solar technologies, upgrading of power transmission lines, promotion of hydrogen technologies for electricity storage, and greater storage of emergency fuels. One bright spot concerns Israel's regional status with regard to connectivity and energy exports. The dependence of Egypt and Jordan on Israeli gas proved to be a moderating factor in the war, and plans to connect pipelines and power lines from the Gulf countries to Europe through Israel received an additional incentive following the Houthi attacks on Bab al-Mandab.

At the first energy forum meeting of the Geo-Energy Program at the Begin-Sadat Center for Strategic Studies, experts and executives from the private and public sectors and researchers from the BESA Center gathered to answer three central questions: (1) What are the immediate dangers to the Israeli electricity sector if the war against Hezbollah in the north is expanded, and what can be done to reduce them? (2) What solutions can be implemented in the Israeli electricity sector to reduce these dangers in the future? (3) What are the effects of the war on Israel's position in the regional energy economy in the short and long term? This paper summarizes the main insights that emerged from the meeting.

1. The immediate dangers to the electricity sector in Israel

In the short term, the war has exposed several significant weaknesses in the Israeli electricity sector for which there is no immediate solution. Nor is there any unanimity regarding the severity of these weaknesses in a scenario of war in the north. There is a great difference between the various estimates for power outages in extreme scenarios in different regions of Israel, estimates that range from a few days without electricity in the major cities and the center of the country, to several weeks in border areas that will be largely evacuated of people. These estimates also depend on the phase of the electricity generation process that was damaged as a result of a missile strike or other attack: (a) the production and transportation phase of fuel to the power plants (gas rigs and pipelines), (b) the electricity generation phase (power plants and substations), or (c) electricity transmission and distribution (power lines and power poles). Each stage requires a separate consideration of damage that may be caused and solutions that can be produced.

A. Scenarios of damage to offshore gas production rigs and gas pipelines

The most significant weakness of the electricity economy during wartime stems from the fact that Israel depends on a limited number of gas fields and transmission pipelines for 70% of its electricity production mix and does not have the capacity to recover this amount in full in the event of a supply cut. For example, it is likely that a war in the north would result in the immediate, if temporary, closure of the Leviathan and Karish fields. That would render Israel completely dependent on the Tamar

field. In an extreme scenario of war on both fronts, during which the Tamar field would also be closed, as happened in the first month of the war in Gaza, Israel would not have enough natural gas to produce electricity. This is one of the reasons Israel chose not to open a second front in the first six months of the war.

In the current situation, the likelihood that Hamas will succeed in deactivating the Tamar field is much lower than it was in October 2023. The closure of the Tamar field in the first month of the war was done as part of emergency regulations and based on the assumption that the Leviathan field would fill the gap, not because the field was damaged. There is no need for something similar to happen to Karish or Leviathan during a war against Hezbollah if it is not possible to guarantee backup from the Tamar field. In such a case, the gas fields would be activated even during an emergency and active protection would be required for them.

The State of Israel prepared in advance for different scenarios of attempts to damage gas rigs and pipelines, and there are defense systems in place, from both air and sea, that have proven themselves for the Tamar field. With that said, these systems did not withstand the test against naval threats or the quantities of missiles that can be expected in the event of an attack by Hezbollah.

Theoretically, to the extent that Israel has sufficient onshore storage of natural gas, such an extreme scenario can be avoided. But at the same time, it could be that the costs of establishing a significant terrestrial reserve of natural gas, as well as the danger that such a reserve would itself be a target for missiles, does not justify its establishment. In any case, such a reserve will not be established in time to be relevant to the current war.

B. Scenarios of damage to the power plants in Israel

The power plants in Israel are concentrated on the coastal plain in a number of individual points and are therefore a target for attack. At the same time, the power plants know how to deal with direct damage and can back each other up in an emergency because they are all connected to the national grid. Damage to the substations may produce greater

damage than to the power plants themselves, but this damage would be limited and can be repaired within a few days. In the scenario of a war with Lebanon, it is likely that demand for electricity would be reduced dramatically because people would stay in their homes, leaving reserves for backup when needed.

A more likely scenario, then, is that the power plants would be shut down not because of damage but because of fuel shortages resulting from natural gas supply interruptions. One weakness of the Israeli electricity sector is that too few gas power plants are equipped to switch to coal or fuel oil in an emergency to fill the gap. Such stations have been closed over the years to meet environmental goals and because their economic efficiency is much less than that of a gas station based on a local resource instead of imported fuel.

Even if there are enough stations that can quickly switch to coal when needed, Israel's emergency coal reserves are probably not large enough to last very long, so there would be a need to import more during the war. To deal with such a scenario, Israel needs to increase its coal and fuel stocks temporarily in preparation for the expansion of the war. This highlights the importance of governmental and semi-governmental companies like Natgaz and Katza, which are responsible for unloading fuels and transporting them around Israel and can be required to do so even during a missile attack. However, if the coal port in Hadera or the ports in Haifa, Ashdod and Ashkelon are within range of Hezbollah's missiles, foreign tankers might refuse to dock in Israel because of insurance limitations, as happened with oil tankers during the Second Lebanon War.

C. Scenarios of damage to power lines throughout the country

Power lines and power poles are the most exposed component during a missile strike and cannot be practically protected. It is very likely that during a war in the north, power outages will occur in different areas of the country depending on the range of the missiles, as occurred in the southern area in the first month of the war in Gaza. At the same time, power lines are the easiest component to repair, depending on the area of damage. It is likely that power lines in the cities would be repaired the same day, while power lines in more remote areas of the country would

remain disconnected for a few days. The fact that the national electricity grid is managed and maintained by the Israel Electric Company (IEC) is a point of strength, because private companies will not risk their employees to repair power lines under attack.

The question that arises therefore is not whether a prolonged blackout scenario in Israel during a war in the north is a reasonable event, but how we define a "prolonged outage" and what is a "reasonable event" for the Israeli citizen. One of the "weaknesses" of the Israeli electricity economy, which stems precisely from its good condition, is the lack of readiness of the Israeli citizen to withstand a prolonged power outage, mainly because this is a phenomenon to which he is not accustomed. The Israeli electricity economy is one of the best in the world when it comes to supply continuity and reliability. The Israeli citizen rarely experiences power outages that last more than a few hours, while in other countries power outages of several days are a periodic scenario due to, among other things, extreme weather events that are not common in Israel.

The average power outage in Israel is less than three hours cumulatively throughout a calendar year, while in the US the general average is eight hours, and in several areas it is twenty hours. As a result, the average Israeli citizen is not prepared for prolonged power outages in terms of emergency lighting, stocks of water and food that does not need refrigeration, and rechargeable batteries. The effect is mainly psychological. Many Israelis responded to routine messages from the Home Front Command about the need to prepare for an emergency by purchasing large quantities of water and back-up generators that run on diesel, an option that is not efficient for private apartments. The frontline command therefore has to balance at all times between the need to inform people and prepare them for an emergency scenario, and the fear of creating a panic that will lead to a shortage of basic products and a self-fulfilling prophecy.

2. Solutions to increase the security of the electricity sector in Israel

Right now, short-term solutions to the weaknesses in the Israeli electricity sector are almost nonexistent. The moves required to increase the security of the Israeli electricity sector require several years and the installation of expensive infrastructure. These include additional gas

pipelines, the establishment of onshore emergency gas reserves, the decentralization of the electricity sector through a wider deployment of power plants of various types, the upgrading of electricity transmission lines, the promotion of solar solutions on the roofs of houses and in vacant areas (for example in the Gaza Envelope), the promotion of hydrogen technologies for electricity storage, and greater storage of emergency fuels. The Ministry of Energy was already promoting most of these solutions even before the war, but the war helped greatly in increasing awareness of the issue and speeding up the plans.

At the level of the private consumer, many saw the war as an opportunity to purchase solar panels for house roofs as a personal backup during a blackout. Many also viewed the wide array of solar panels that were installed over the years in the Gaza Strip, which provided about 40% of the electricity in the Strip during the first month of fighting, as proof of the ability of independent solar systems to provide electricity in an emergency.

There is no doubt that the desire to promote renewable energy in Israel is strong and will help Israel meet the goals it has set for itself (30% electricity from renewable energy by 2030). At the same time, it should be remembered that solar panels only provide electricity for a third of the day, and the addition of hybrid batteries allows for a few more hours of electricity after that. For the Gazans, this is a better solution than a complete lack of electricity, but for the Israeli consumer, the ability of solar panels to serve as a solution to his needs is only partial. Also, unlike the Gaza Strip, existing regulations in Israel do not yet allow a private citizen to set up a solar array that is disconnected from the central transmission grid, so damage to the grid would also damage the ability to generate electricity at the private level.

Real and long-term solutions to increase the security of the electricity sector in Israel will need direct and extensive government support. This support will be expressed, among other things, by providing guarantees to the private energy companies in order to grant them long-term stable regulatory and economic certainty for the search for and development of additional energy reserves. There should also be moves to freeze budgets, thaw land, and circumvent regulations that have prevented

small companies from developing and implementing new technologies of renewable energy throughout the country (solar, hydrogen, and more). Such moves require a lot of coordination between different ministries, from the Ministry of Finance to the Israel Lands Administration, as well as the electricity and gas authorities. This coordination can help companies in the private sector promote solutions for gas production and the establishment of solar arrays. It can also help the electric company promote a more advanced set of electricity networks for the absorption of renewable energies. The key is for the Ministry of Energy to be able to coordinate these entities smoothly, without the need to go through so many stages for project approval.

3. Effects on Israel's position in the regional energy economy

One of the main points of light to emerge from the analysis concerns Israel's regional status, which has not been damaged with regard to connectivity and energy export plans. In fact, it might even improve in the coming years. In the last decade, Israel, together with the private energy companies, led broad and unprecedented regional moves to connect gas pipelines to Jordan and Egypt. These connections created a regional dependence on Israeli gas. This played a moderating role during the war, especially concerning Egypt's conduct. While the shutdown of the Tamar rig at the beginning of the war hurt exports to Egypt, in the end the event increased Cairo's understanding that it depends on Israeli gas and must strive for stable and positive relations with Israel if it wants to expand gas exports to it. The Jordanian dependence on gas and water from Israel is also very noticeable during the war, and it is even possible that it helped the Jordanians make the decision to take an active part in the interception of the Iranian missiles and UAVs that penetrated its airspace on their way to Israel on April 13, 2024. On the surface, the Jordanian kingdom adopted a very firm rhetoric towards Israel and even announced the freezing of the "Prosperity Green" and "Prosperity Blue" projects, which were designed to promote trade in green energy and desalinated water between the parties. However, it is very likely that these projects, as well as more ambitious collaborations, will be renewed shortly after the end of the war. Many see the Jordanian statements as lip service intended to pacify Jordan's Palestinian population, who make up

the majority of the kingdom's residents, but there is always a fear that these considerations will ultimately be decisive in the long run.

It must be taken into account that the cancellation of the planned projects with Israel is a move that would hurt Jordan much more than Israel. Jordan desperately needs water from Israel while Israel does not really need electricity from Jordan.

Beyond regional dependence on Israeli gas, the European desire for gas from the eastern Mediterranean, which increased following Russia's invasion of Ukraine, has not waned during the war. However, the damage to the continuity of the supply to Egypt at the beginning of the war hurt Europe because Egypt liquefied almost no gas for export due to the shortage. This resulted in Europe's having to increase imports of liquefied gas from elsewhere at higher prices, including even from Russia. As a result, there is a fear that Europe will prefer to find a more stable and reliable source for its gas than the Eastern Mediterranean. But there are two reasons for optimism.

The first is that large European energy companies such as BP and ENI are confident in the potential to find additional gas in Israeli waters, and in October 2023 were granted drilling licenses. In addition, over the past year the United Arab Emirates has been promoting the purchase of a significant percentage of the Leviathan field, even if it is frozen for the time being during the war.

The second reason is that the Houthi attacks on the Bab-el-Mandab straits made it clear to Europe that even alternative sources of liquid gas from the East, such as Qatar or Australia, are vulnerable to security threats and blockades. More than that, it is possible that the Houthi attacks helped Israel promote plans to establish a land infrastructure corridor between Israel and the Gulf states in the style of "Railways to Peace," which would bypass the Red Sea and the Suez Canal and include the expansion of gas, hydrogen and power lines. These programs are still on the table and it has even been hinted that they will be part of the basket of benefits following a possible normalization agreement with Saudi Arabia.

It can therefore be safely said that plans for the continued development of the Israeli energy economy have not been harmed as a result of the

war. At worst they were slightly delayed. These plans include the continued development of the Israeli gas fields in order to increase production and exports, the search for additional gas fields in Israel's economic waters, the establishment of a gas liquefaction facility for Europe and Asia, the connection of an underwater power line between Israel and Cyprus and later also to Europe, and possibly later also the connection of a corridor infrastructure to the Gulf countries through Jordan that will include power lines and gas, oil or hydrogen pipelines.

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