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A Defense Strategy for the Energy Facilities in the Maritime Environment: The Case of the Security Threats to the Dor Facility

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Introduction

The maritime domain of the State of Israel[1] answers many of the country's social, economic and environmental needs. It has a huge potential for providing energy resources, it is the main source of input for the production of water for household consumption and it contributes to the country's heritage and endowment of nature. The maritime domain also constitutes the main conduit for trade to the rest of the world and there are those who view it as a land reserve that can be used for infrastructure facilities and perhaps even urban development. Furthermore it is the "blue lung" of Israel which includes open landscape and a huge expanse for recreation and leisure (Technion, 2015).

During the years 2009-2010, large reserves of natural gas were discovered opposite the coast of the State of Israel in its Exclusive Economic Zone (EEZ or economic waters). These reserves serve as the major source of energy for the production of electricity in Israel and they are expected in the future to constitute one of the main sources of energy for transportation and local industry. Furthermore, it is planned that in the future, part of the gas reserves will be exported and it is estimated that the royalties to be received will constitute a significant source of income for Israel (State of Israel, 2013). In addition, it is expected that these energy sources will also answer any future growth in the regional needs for electricity and water (Shaffer, 2011).[2]

Accordingly, in recent years, there has been accelerated development of these discoveries in Israel's economic waters and on the coast. Thus, for example, the Leviathan field, which is the largest one[3] and is located about 125 km west of Haifa, is expected to begin production in 2020. Its development is based on a designated underwater production system that will be connected to a network of pipes to a fixed production rig, which will be located 10 km from the coast in the western portion of

1 The maritime area is estimated at 26,000 cubic meters, which is larger than the dry land area.

2 Israel is implementing a national plan for the desalinization of water which includes the construction of desalinization plants that are among the largest in the world. The method of desalinization chosen for these facilities is reverse osmosis and the source of energy for their operations is natural gas.

3 The total conditional amount of natural gas is estimated to be 621 BCM and close to 40 million barrels of condensate (the Leviathan Project, 2019).

the northern maritime territory, near Dor Beach. In addition, there is the Karish-Tanin project whose fields are located from 75 to 120 km west of Israel's northern coast. Its development will be based on a designated underwater production system that will be connected to an FPSO ship which will be anchored near the Karish field and will be used for the treatment and separation of the raw material. The resulting natural gas will be pumped to the coast while the oil will be stored on the FPSO ship and will be exported by tanker at a rate of 7 shipments per year (Mekorot).

However, the State of Israel does yet have an overall policy for managing the maritime domain and all of the conflicts that arise within it. Israel's maritime policy is primarily sectoral, which leads to regulatory chaos in which a large number of different (and sometimes conflicting) regulatory authorities relate to the same maritime environment, each with a narrow perspective and without any clear order of priorities (Zimmerman, 2017). Moreover, since the State has only recently had to deal with the maritime domain, a maritime culture has not yet emerged and a base of knowledge on the subject has yet to develop. Essentially, the authorities that regulate Israel's maritime environment lack expertise and the appropriate tools to carry out their task.[4] In this situation, a reality is emerging that will determine the future of Israel's maritime domain for years to come and will have an increasing effect on the State's national interests, assets and resources. All this is happening in the absence of an overall strategic perspective.

Against this background and in light of the explicit threats to attack the gas rigs, a public discourse has recently developed which has expressed the need to examine the possible solutions for the development of the State's maritime energy infrastructures, including from a security perspective.

Accordingly, this essay discusses the formulation of a security policy for the energy facilities in the marine environment, including the examination of alternatives for the cases of the Leviathan, Karish and Tanin discoveries and for the Dor maritime complex.

Method

The formulation of policy rests on three main components: (1) the goals of the policy – primary and secondary; (2) the scope of the policy – the areas to which it relates; (3) the period of the policy – the period during which the policy will remain valid.

4 Or policy makers rely on bodies that have different interests or outlooks to theirs and in addition they lack the ability for effective control.

Accordingly, during the formulation of security policy for the maritime energy facilities the following components will be present:

1. Primary policy objectives which usually include maintenance of public health and human lives, maintaining sustainability and preserving the environment, ensuring energy independence,[5] and economic efficiency. Alongside these can be secondary objectives such as operational or legal elements;
2. The scope of the policy which essentially delimits the content of the policy and is characterized by three layers: (a) prevention or mitigation of risk; (b) minimization of the scope of damage in the event that the risk is realized; (c) ability to return to a minimal level of functioning as quickly as possible (achievement of robustness);
3. Period of the policy – in the case of critical infrastructures in general and maritime energy infrastructures in particular it is the practice to consider a period of 30 years.

In light of these fundamental components, an analysis was carried out with the goal of generating possible solutions (hereafter: also alternatives) and the comparison of one to the other. To this end, the principal alternatives are first set out; then, each of the alternatives is examined in depth, including an analysis of vulnerability and risk assessment.[6] Following that, a range of tools and methods for mitigating the scope of possible damage is considered and the solutions required for a return to functionality are analyzed. As mentioned, once the alternatives have been described, a multidimensional comparison is made and the result is a collection of the preferred solutions (which will serve as the foundation for decision making).[7] A basic model of this method is presented in Figure 1.

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5 This factor can be replaced with “maintaining functionality”.

6 A designated method to accomplish this was developed at the Sandia Institute (Sandia, 2010) and includes, among other things, the characterization of the infrastructure, an identification of undesirable events and the critical assets it includes; an assessment of the expected results in the case of a realization of the undesirable events; a definition of the possible threats, including an assessment of the likelihood of their occurrence, alongside defensive capability; and finally an analysis of the level of risk reflected in the threats to the infrastructure.

7 Usually problems of this type are characterized by a multiplicity of variables and do not have a unique optimal solution. Accordingly, the method generates a “Pareto frontier”, which is a collection of possible solutions which are preferable, even if only partially so, over other possible solutions, and from which the optimal solution will be chosen by decision makers.

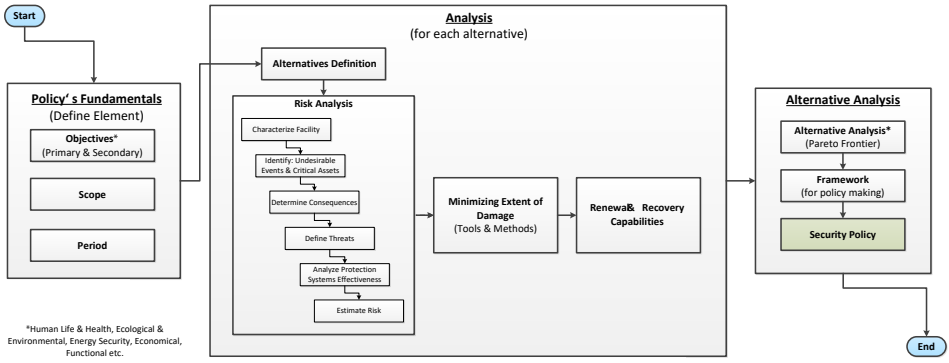

Figure 1: Model for security policy formulation

Case study of security threats to the Dor facilities

Analysis

As part of the research study (Zarhi, 2018) to examine the vulnerability of the maritime energy infrastructures to security threats and as a basis for creating a framework for policy formulation, the main maritime energy projects that are currently being developed and are intended to serve Israel's energy sector in coming decades – the Leviathan and Karish-Tanin projects and the Dor maritime facilities – were considered.

Accordingly, four alternatives were defined for consideration: (a) the current situation, which includes a marine handling platform near the coast and a floating production, storage and offloading (FPSO) unit; (b) an alternative identical to the existing situation except with the addition of FSO near the rig that will be used for the storage of oil;[8] (c) an alternative based on handling by means of an FPSO unit in the contiguous waters; and (d) an alternative based on handling by means of an FPSO unit in the economic waters near the gas rigs. Figure 2 presents the various alternatives.

Findings of the analysis

The main conclusion of the analysis is that **production by means of an FPSO unit in the contiguous waters has a relative advantage in comparison to the other alternatives**. Thus, the alternative provides an optimal solution from the perspective of overall risk level and extent of damage in a security event. Furthermore, the

8 According to what is possible as part of National Zoning Plan 37h.

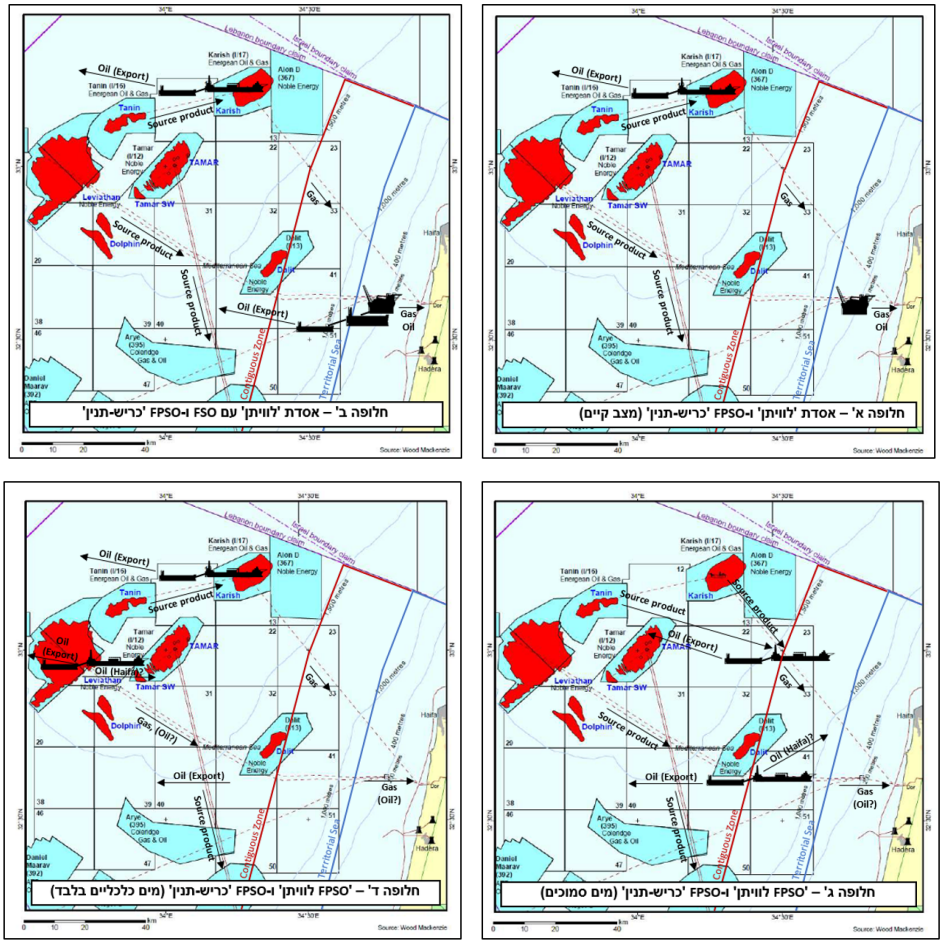

Figure 2: The various alternatives.

alternative also provides a balanced solution from the perspective of national resilience, operations, law and consistency with a grand strategy.

Moreover, an analysis of the damage components (intensity of the events) indicates **the possibility of the development of outcomes with high to very high levels of damage intensity in the case of an undesirable event involving assets near the coast**. In this context, it was found that the alternative of using an FSO unit near the rig is inferior to the other alternatives.

In addition, the findings indicate that a “mixed alternative”, which is composed of assets near the coast and assets distant from the coast, inherently includes

significant risk factors and is also characterized by high variance. Thus, essentially, **these alternatives, including the current situation alternative, generate a reality that makes it difficult to formulate a comprehensive, efficient and effective multidisciplinary approach**.

Furthermore, it was found that **the State's defenses provide an appropriate response to most of the threats to the assets near the coast**, except against long-range precision land-to-sea missiles, ramming by a ship or an explosives-rigged civilian aircraft (particularly during periods of calm); and that **closeby defense provides an appropriate response to most of the threats to assets remote from the coast**, apart from ramming by a ship or an explosives-rigged civilian aircraft and to some extent underwater threats (particularly in the economic waters).

The analysis also found that a major layer in the defense capability, particularly in times of conflict, is the **use of soft means of defense that significantly reduce and even eliminate the overall risk**. In particular, it was found that the **use of mobile platforms has a significant advantage over the use of fixed platforms in eliminating risk and in dealing with a situation of failure**. Similarly, the ability to cool off the handling and production facilities in an emergency situation is likely to reduce the risk to a very low level. In addition, the determination of total storage capacity and the definition of design requirements and the operational configuration—which are derived from the various threats and the characteristics of the environment—constitute one of the main layers in the effort to limit potential damage in the case of an event occurring.

Main recommendations for policy formulation

In view of the findings of the analysis, it is recommended that t**he energy facilities, and in particular the handling and production facilities, be based on mobile platforms (i.e. FPSO) at the remote edge of the contiguous waters**.[9,10]

In addition, it is proposed that **a comprehensive and multidisciplinary national strategic doctrine be formulated for the management of Israel's maritime domain**

9 At about 45 km from the coast.

10 From the viewpoint of dispersion of an oil spill, the longitudinal location (the longitudinal current flows along the coast from South to North and exists for most of the days of the year), alongside the element of depth, has critical significance. In this context, a specific analysis should be carried out of every possible location, taking into consideration the localized effects.

including the critical assets located within it and the manner in which they should be protected.

It is also recommended that **the soft defense components be integrated as a primarily tool in the protection of the energy infrastructure**. In particular, it is proposed that an ability be created to detach and sail the mobile platforms in a time of emergency; to build in backup in the form of an alternative FPSO unit in the event of failure; to assimilate capabilities to "cool" the handling and production facilities; and to ensure control over the potential damage, by means of limiting the amount of oil and hazardous materials[11] that are likely to be released in the occurrence of an event. In addition, it is also suggested that greater use be made of geopolitical pressure and in particular against major players in the region who are likely to suffer damage in the event of a successful attack on distant energy infrastructure. These players are likely to include, among others, Lebanon, Syria, Turkey and even Russia.

In addition, it is recommended that **the components of hard protection against precision long-range land-to-sea missiles be strengthened and also that the mechanisms to deal with ramming by a ship or suicide aircraft be formalized**, especially in the case of the contiguous waters.

Similarly, it is recommended that **the national preparations to deal with a major oil spill be completed**, starting with the updating of the reference scenario based on the proposed doctrine,[12] that efforts continue to lay the legal, regulatory and budget groundwork and that gaps in equipment and manpower be filled, including the raising of skill levels.

In addition, it is recommended that **the judicial and legal status of Israel's maritime zone be formalized, in a manner consistent with the overall doctrine for the management of the maritime domain** (which was recommended previously). In this context, **emphasis should be placed on the regulation of the contiguous waters**, in a way that will make it possible to provide a suitable level of security for critical assets found within it, including an appropriate solution for the spectrum of needs in the region.

11 To this end, a number of tools are available including, among others, the limitation of the overall storage capacity, the use of a unique engineering design (such as division into cells, each of limited capacity; protected location; use of physical fortification elements; etc.) and mode of operation (MOO). All of these are to be based on an analysis of the threat to security and safety.

12 Accordingly, an ability is needed to provide an effective response within a few days (about 4).

In conclusion, it is recommended that **a centralized and professional mechanism be established that will bring together the existing knowledge on the subject**. It is proposed that this body carry out a periodic examination of the various issues in a systematic and multidisciplinary manner, with the goal of optimally adapting the overall doctrine for managing the maritime domain to the changes occurring within it.