

2023

The National BlueTech Plan



Ministry of Innovation,
Science & Technology

Statement of the Minister of Innovation, Science and Technology

Within just 75 years, the State of Israel has established itself as a global power in the innovation, science and technology fields.

Owing to exceptional human capital and pioneering creativity, Israeli researchers and entrepreneurs are advancing the State of Israel towards unprecedented economic growth and security resilience.

When I took the reins of the ministry again, I ordered the publication of national plans covering Israel's national priority fields. The aim is to maintain Israel's global lead in diverse technological fields – and reap its social and economic fruits.

We are now providing another asset that will help us on the way to technological and innovational leadership by publishing the National BlueTech Plan: Marine Technologies.

Offshore economic activity is gradually gaining global attention. The United Nations Organization has established the subject of offshore development as a global objective and has defined the coming decade as the “decade of marine science.”

Israel has a unique need to develop the sea as a natural resource: we depend on the sea for energy and trade purposes, for future infrastructures and for drinking water, for coping with security challenges and many other needs. Owing to the excellent capabilities of Israeli researchers and entrepreneurs, we are at an excellent opening point for developing marine technologies: extensive academic activity in life science, geographic conditions that are suitable for marine R&D (including access to four water bodies that have broad biodiversity), expertise in disciplines with potential for offshore application and a global lead in core disciplines (such as marine agriculture and desalination).

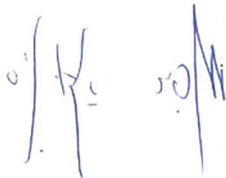
The realization of Israel's potential for developing marine technologies requires coordination between many public entities operating in the offshore space. The National BlueTech Plan constitutes a first step in linking all of the players operating in the offshore space: Government ministries, higher education institutes, BlueTech companies in the industry, local authorities, third sector organizations, defense agencies and many other entities.

I thank the many representatives from more than 30 public entities for their work on the report provided here.

I am confident that through trans-sectorial cooperation efforts, with the backing of a broad national process and an orderly national plan, we can advance Israel's BlueTech field to center stage: in our own country and in the international scene.

Best regards,

Ofir Akunis



The Minister of Innovation, Science and Technology

Foreword

The Ministry of Innovation, Science and Technology and the National Economic Council in the Prime Minister's Office are happy to publish the National BlueTech Plan, which summarizes the combined planning activity of dozens of entities – governmental, academic, business, municipal and others, which are operating in the offshore space.

The National Plan offers an answer to two transverse barriers that impede the realization of BlueTech potential in Israel: (1) a shortage of enabling infrastructures for promoting BlueTech (research infrastructures, information and data infrastructures, financing and human capital infrastructures); (2) the lack of a central organizational framework for promoting BlueTech in Israel. The barriers to promoting the field bear on a wide range of issues, which are under the responsibility of many entities operating in the offshore space.

The National BlueTech Plan is intended to assist in the development of a *broad, diverse ecosystem that has a global lead in the BlueTech field, which will serve as a growth engine for the blue economy, will drive marine innovation, and will help Israel cope with national challenges by developing the sea as a sustainable natural resource* (vision of the National BlueTech Plan).

The National Plan, combined with its many moves, constitutes a direct continuation of additional governmental moves that have been made in recent years to promote the blue economy (in general) and BlueTech (in particular). In August 2022, the Civil Research and Development Council recommended defining the sea as one of Israel's national priority fields in science and technology, and in the same year, the Planning and Budgeting Committee defined the marine science field as one of the three focus areas for basic research in Israel.

At the same time, the Planning Administration formed a national outline plan for innovative offshore facilities (which are currently at the approval stage) and the Ministry of Agriculture has started to implement a Government Resolution for developing the city of Eilat as an international hub for producing food from the sea.

In addition, the National Blue Innovation and Economy Center has been established and inaugurated in Haifa (2020), a national policy for planning and regulation of Israel's offshore space has been formed (Planning Administration, 2020), Government Resolutions for monitoring the Mediterranean Sea (2018) and for promoting the construction of artificial islands (2018) have been passed, and many special-purpose entities dedicated to promoting the field have been established.

The Ministry of Innovation, Science and Technology and the National Economic Council in the Prime Minister's office wish to express their sincere gratitude to the many partners active in realizing the economic and scientific potential of the offshore space and welcome the unique cooperation that has led to the formation of the National BlueTech Plan that is laid down in this report.

Best regards,

Eitan Thee



VP Planning, The Ministry of Innovation,
Science and Technology

Yuval Admon



Deputy Head of the National Economic Council
The Prime Minister's Office

Executive Summary

The Vision of The National BlueTech Plan

Development of a **broad, diverse ecosystem that has a global lead in the BlueTech field**, which will serve as a **growth engine for the blue-economy**, will drive **marine innovation**, and will help Israel **cope with national challenges** by **developing the sea as a sustainable natural resource**.

Objectives of The National Plan

To implement the vision of the National Plan, four key objectives (success metrics) have been defined within the preparation of the plan:

<u>Success metric</u>	<u>Existing state (2022)</u>	<u>Objective (2030)</u>
Number of companies in the field	80 ¹	300 ²
Number of large companies in the field (500+ employees)	0	3
Number of employees in the field	1,500 ³	10,000
Number of global R&D centers operating in Israel	0	3

Objectives of the National Plan

1. **Development and providing access to enabling infrastructures** for promoting the BlueTech field.
2. **Forming an organizational framework for promoting the field** in Israel.

1 An estimate based on processing of IVC and Pitchbook data

2 Based on the average number of companies in leading countries in the world in the BlueTech field

3 An estimate based on processing of IVC and Pitchbook data

Key Directions of Action for Achieving the Goals of the Plan

Goal	Component		Directions of action ⁴
1. Development of and providing access of enabling infrastructures	A. Research infrastructures and regulatory infrastructures	Providing access to existing infrastructures	1. Mapping of all existing research infrastructures
			2. Formation, regulation and simplification of processes of using the existing research infrastructures
		Development of new infrastructures (general)	3. Defining a central entity for identifying missing infrastructures and recommending infrastructures for development
			4. Defining a central entity for developing new infrastructures. ⁵
			5. Characterization and formation of a Sea Days foundation. ⁶
			6. Examination of enrollment into international infrastructure organizations. ⁷
		Development of new infrastructures (in polygons) based on NOP 13C	7. Completion of the process of defining and approving polygons for offshore tests
			8. Formation and adoption of an efficient process for approving and conducting offshore tests
			9. Establishing and operating infrastructures in polygons. ⁸
			10. Allocation of operational areas in ports as an onshore rear area for offshore tests
	B. Information and data infrastructures	11. Expansion of the shallow sea monitoring apparatus	
		12. Establishing a monitoring apparatus in polygons	
		13. Establishing a national database. ⁹	
	C. Financing and human capital infrastructures	14. Expansion of the financing for offshore research and development at Government ministries	
		15. Expansion of human capital financing and development channels in the academia	
		16. Encouraging the seeding of new startup companies and development projects in existing companies	
	D. Additional infrastructures: education and exposure	17. Expansion of exposure to the sea and marine innovation	

⁴ In the body text, the directions of actions are highlighted and numbered (in increasing order throughout the document)

⁵ Including procurement, operation, maintenance and providing access

⁶ A specific budget for sea days for researchers and entrepreneurs

⁷ International organizations that allow access to foreign research infrastructures (after mapping of the existing infrastructures around the world)

⁸ Electricity, communication, anchoring to the ground and more

⁹ A free database, accessible to the government, academia and industry

2. Formation of an organizational framework for promoting the field in Israel	E. A dedicated governmental entity for promoting the field		18. Appointment of a governmental entity for leading the BlueTech field
	F. Trans-sectorial and trans-disciplinary cooperation efforts	At the regional level	19. Development of regional specialty hubs
		At the national level	20. Establishing interfaces for transferring knowledge and information between the government, the academia and industry
		At the international level	21. Promotion of international cooperation efforts

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Introduction

Definitions: *Blue Economy & BlueTech*

In recent years, the domestic and international discourse about the broad economic potential of the offshore space has been increasing. In academic and governmental corridors alike, in international conferences and in industrial functions, the term *blue economy*¹⁰ is repeatedly mentioned. This is *a strategic policy for educated, sustainable maximization of the sea's economic potential*. From marine agricultural activity, shipping and tourism, to generating energy from waves and protecting the offshore environment, the term blue economy is not limited to any single economic sector and covers a broad spectrum of sectors involving activity in the offshore space.

Whereas *blue economy* refers to economic activity in the offshore space in general, the term *BlueTech* focuses on technological and innovative offshore activity, and may be defined as *the technological and innovative sector of the blue economy*. This means that *BlueTech* includes a wide spectrum of technologies and activities to promote marine R&D and is perceived as a “basket” that includes all fields related to innovation and the sea.

“Blue economy”: educated, sustainable utilization of the sea's economic potential

	Air	Land	Sea
Energy			The blue economy
Transport			
Agriculture			
Tourism			
Commerce			
Security			
...			

“BlueTech” – the technological and innovative sector of the blue economy

	Technologies	R&D	Innovation
Offshore energy	BlueTech		
Maritime transport			
Marine agriculture			
Offshore tourism			
Offshore commerce			
Maritime security			
...			

Plans for promoting the blue economy and BlueTech worldwide

In the last decade, economic and innovative offshore activity has gradually been assuming centerstage in global attention. In 2015, the United Nations Organization established the subject of offshore development as one of the global objectives for sustainable development¹¹ and defined the coming decade as the “marine science decade.” Other international organizations, such as the European Commission and the OECD, followed suit by establishing their own initiatives for promoting the field, combined with specific programs and forums for offshore innovation and research.¹²

¹⁰ Review of the Blue Economy in Israel – Existing State and Opportunities, Ehud Gonen (University of Haifa), 2022

¹¹ The breakdown of the objective mentions “increasing the use of scientific knowledge, development of research abilities and transfer of offshore technologies”, this being “in order to improve the health of the oceans and strengthen the contribution of marine biodiversity to development of the developing countries

¹² For example, the European Union established BlueMed – Blue Mediterranean Initiative.

This forum deals with leveraging of innovation and multidisciplinary research for developing the Mediterranean Sea and its shores: Research and Innovation for Blue Jobs and Growth

As global activity on the issue increases, many countries have started to form independent national plans to promote the blue economy and BlueTech in their own territories. The Portuguese national program,¹³ for example, defined many steps to promote offshore innovation, including encouraging research and development activity, expanding the volume of investments in the field, mapping Portugal's offshore space and defining focus fields for development (for example: the shipping sector). At the same time, other countries started to develop their own specialties: offshore energy (the United Kingdom, Denmark), marine agriculture (New Zealand, Canada), conservation of seas (Australia), marine biology (France), offshore engineering (Japan) and others.

The need for a national BlueTech

Based on an international comparison, the need to develop the sea as a national resource manifests greater in the Israeli context, for 8 key reasons: (1) Israel's offshore space is greater than the country's onshore territory, (2) Israel depends on the sea for drinking water – 55% of nonagricultural consumption of water in Israel is of desalinated seawater;¹⁴ (3) the energy sector in Israel is based mostly on the sea – 70% of electricity generation in Israel is based on gas, and the sea constitutes a potential space for producing renewable energy; (4) 99% of Israel's international commerce is executed via the sea;¹⁵ (5) Israel has one of the world's highest population densities,¹⁶ and the sea constitutes a potential space for future infrastructure facilities;¹⁷ (6) Israel is required to contend with unique security challenges that require extensive, innovative offshore activity;¹⁸ (7) Israel has offshore areas of global ecological importance; (8) the offshore space constitutes a tier in the development of Israel's food security concept as an answer to the climate crisis.

In a global view, Israel is at a favorable opening point for developing the sea as a national resource, with emphasis on development of marine technologies and promoting innovative offshore activity. First and foremost, Israel has extensive academic activity in the marine science field. Today, there are eight key research institutes working in marine research, engaging more than 100 staff members. In the last 20 years, the number (and quality) of publications has increased significantly, and Israel has started to engage in international cooperation with leading countries in the field. Besides well-developed academic activity, another advantage that Israel hies lies in its favorable geographic conditions for offshore research and development activity. For example, compared to other countries in the Mediterranean basin, Israel enjoys a steep continental shelf, an arid climate, broad biodiversity and access to four different water bodies. In addition, Israel possesses expertise in technological fields with potential for implementation in the offshore space (cyber, artificial intelligence and more). Finally, Israel enjoys a global lead in marine agriculture and desalination technologies, and has a general international reputation as a "Startup Nation."

¹³ "National Ocean Strategy 2021–2030", Portugal's Ministry of the Sea, 2021

¹⁴ Review of the blue economy in Israel, Ehud Gonen, 2022 (based on the Israel 2021 statistic annual, the Central Bureau of Statistics)

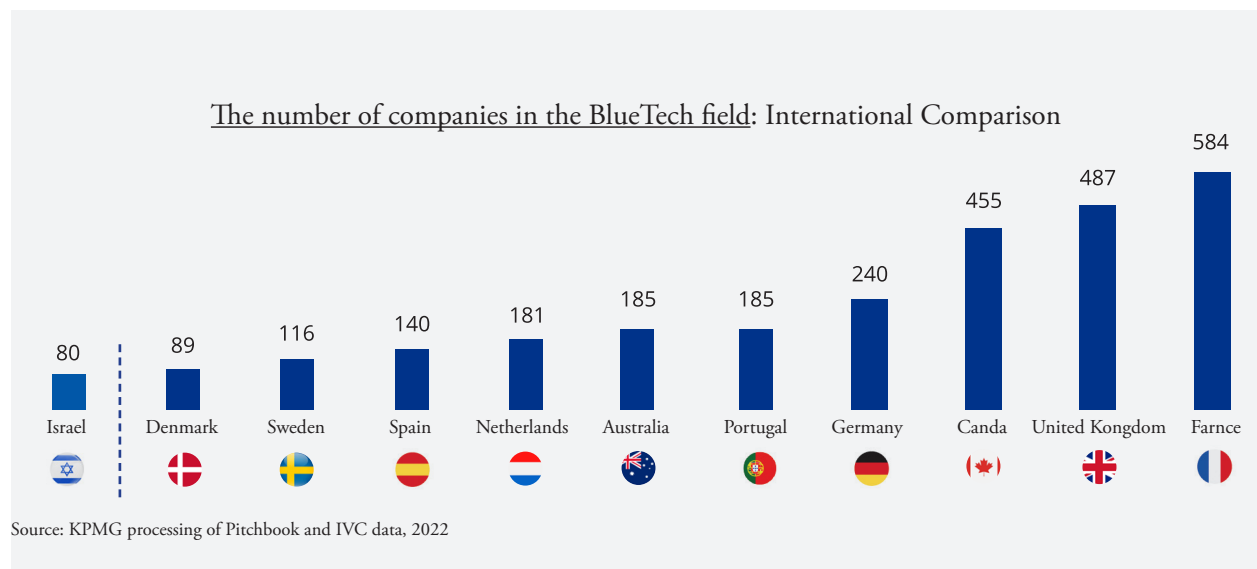
¹⁵ Israel Ports Company data

¹⁶ Our World in Data, Statista

¹⁷ The National Research and Development Council's report "presentation of the sea field as a national resource for Israel" (2022) states: "Israel is one of the densest countries in the world, primarily along the coastal plain. It would seem that the sea is the only vacant place in Israel for passing utility lines"

¹⁸ The Ministry of Defense's "Blue-Tech and Security" Report (2022) states: "The offshore space constitutes a significant part of Israel's national security concept. The defense establishment is in charge of research, development, procurement and use of capabilities for maintaining security marine superiority.. [it is] important [to] maintain and develop capabilities in offshore contexts"

Despite the importance of the sea to Israel and the potential for developing marine technologies, the domestic BlueTech field is at the embryonic stage. As of the time of writing, there are approximately 80 BlueTech companies in Israel, and just four new companies are established each year¹⁹. Based on an international comparison, the number of BlueTech companies in Israel and the volume of investment in them is low compared to leading countries in the field (in absolute terms and after adjusting for the size of the population).²⁰ With just two technological incubators (Ashdod and Haia Port),²¹ and a small amount of activity of venture capital funds operating specifically in the field, no Israeli BlueTech ecosystem seems to have been established yet.



Four transverse barriers that impede the independent development of BlueTech:

- **Shortage of enabling infrastructures for promoting BlueTech**

1. Research, information and data infrastructures: Offshore research and development activity depends on the presence and accessibility of complex, expensive infrastructures, which most institutes and companies are unable to establish, operate, share and maintain independently (infrastructures such as research ships, undersea robots, “wet” research laboratories, offshore monitoring apparatus, marine database and more). As set forth below, the key deficits in marine infrastructures in Israel are: (1) existing infrastructures are not optimally utilized; (2) there is a shortage of critical infrastructures (research infrastructures and information and data infrastructures).

¹⁹ KPMG processing of Pitchbook and IVC data

²⁰ KPMG processing of Pitchbook and IVC data

²¹ As of the time of writing, the National Blue Innovation and Economy Canter has started to support startup companies in the BlueTech field. The center’s activity is detailed at a later point in this document.

2. Regulatory infrastructures: often, the development of marine technologies requires access to offshore test areas, which poses regulatory difficulties that are unique to the field. As of today, the regulatory gaps are: (1) there are no approved offshore areas in which tests that involve the use of permanent offshore facilities may be performed;²² (2) there is no efficient process for approving and performing tests in the test areas; (3) there are no infrastructures supporting the test areas (such as connection to electricity and communication).

3. Financing and human capital infrastructures: the sea field suffers from a shortage of specific academic programs, research budgets and skilled technical personnel (entrusted inter alia with the operation of the research infrastructures mentioned in the previous section).

- **Lack of an organizational framework for promoting the field in Israel**

4. Presently, there is no “natural” entity integrating and driving the field in the Government.²³ This means that to date, activity for promoting the BlueTech field has been conducted in a decentralized manner, without coordination and by dozens of entities operating concurrently in the offshore space. Today, activity in the field is performed without pooling of resources, without a common vision and without uniform goals.

As may be seen, the barriers to promoting the field pertain to a wide range of issues, and are under the responsibility of many entities operating in the offshore space. To cope with these barriers and realize the Israeli potential for development of marine technologies, an orderly national plan is required for integrating and coordinating the solutions to each barrier, while maintaining close cooperation between the Government, academia and industry. Such a plan draws parallels with other policy for promoting other “Tech” fields,²⁴ and is a direct continuation of national plans for BlueTech and a blue economy worldwide.

Forming of the National Plan for promoting BlueTech in Israel

The National BlueTech Plan stated in this document constitutes a continuation of governmental moves that have been performed in recent years to promote the blue economy (in general) and BlueTech (in particular). Besides these moves (set forth in Table 1), the field is being regularly and continuously promoted by a range of public entities, headed by the Planning and Budgeting Committee of the Council for Higher Education (promotion of basic research in marine science), the Ministry of Innovation, Science and Technology (promotion of applied research in marine science), the Israel Innovation Authority (promotion of BlueTech companies), the Ministry of Agriculture (promotion of applied research in marine agriculture) and the Ministry of Energy and Infrastructures.

22 There is an offshore area for education, research and training for marine agriculture in a municipal construction plan prepared by the Ministry of Agriculture. The Ministry is currently working to regulate the use of this area.

23 For some other “Tech” disciplines, there is Government ministry that is responsible for advancing and leading the discipline at the governmental level; for example, AgroTech – the Ministry of Agriculture; SportsTech – the Ministry of Culture and Sport.

24 Example: the national smart transport plan / MobilityTech – Government Resolution 2316

Table 1: Policy Acts for Promoting the Blue Economy and BlueTech in Israel (2013-2022)

Action type	Action description	Year
Promotion of policy	Defining the marine science field as one of three focus topics for basic research in Israel (within the five-year plan of the Planning and Budgeting Committee of the Council for Higher Education)	2022
	Defining the sea as one of the five national priority fields for science and technology (within the report of the National Civil Research and Development Council ²⁵)	2022
	Forming National Outline Plan (NOP) 13C for offshore innovative facilities ²⁶	2021
	Passing Government Resolution 1442: development of Eilat as an international hub for producing food from the sea ²⁷	2022
	Passing Government Resolution 4339: approval of a national plan for monitoring the Mediterranean Sea ²⁸	2018
	Passing Government Resolution 3344: promotion of the construction of artificial islands off Israel's shores ²⁹	2018
	Formation of a national policy for planning and regulation of Israel's offshore space ³⁰	2020
Establishing special-purpose entities	Establishing the inter-ministerial committee for managing the offshore space ³¹	2020
	Establishing the National Blue Innovation and Economy Center ³²	2020
	Establishing the AquaCulTech innovation community for marine agriculture ³³	2022
	Establishing the Mediterranean Coast Cliffs Preservation Company	2013
	Establishing MERCI – an academic and research consortium for offshore research and development infrastructures ³⁴	2012

25 "Decision on national priority disciplines for civil R&D in Israel", the Civil Research and Development Council, August 2022.

26 Within the plan, 8 offshore areas for offshore tests were defined. The plan's approval process is underway and is expected to end during 2024.

27 Resolution 1442 has three goals: (1) establishing Eilat-Eilat as an international research and applied center for sea and desert food, marine biotechnology and water and desert agriculture; (2) planning and developing a marine agriculture and sea food and product industry park; (3) assistance in economic growth and diversification of employment sources. Within the resolution, the Minister of Agriculture was charged with forming a strategic plan for developing the sector at the national level too.

28 The national Mediterranean Monitoring Plan is intended to ensure that Israel's commitments to the Barcelona Convention are met, whereby Israel is to act to monitor the marine environment owing to the increase in diversity and volume of activities in the region (inter alia development of natural gas deposits, an increase in the volume of desalination, development pressures along the shores and more). Within the Government resolution, an inter-ministerial steering committee has been established to implement the National Plan (under the responsibility of the Ministry of Energy and the Ministry of Environmental Protection) and a project for national monitoring of the offshore area in the Mediterranean Sea (led by Israel Oceanographic & Limnological Research) has been established.

29 Government Resolution 3344 is intended for examining the economic, planning and environmental potential existing in forming artificial islands off Israel's shores, by studying the feasibility of transferring electricity generation infrastructure facilities, desalination facilities, an international airport and more to the sea.

30 In 2020, the Planning Administration completed multiannual and multi-participant staff work for mapping Israel's offshore space. The policy document that was published following the staff work defined "a national framework and infrastructure for realizing the conditions for development of blue growth... combined with environmental review and safeguarding the health of the marine ecosystem". According to the Planning Administration, the realization of the document is intended to "promote offshore development and innovation", while increasing "the certainty of investments in the offshore space". In addition, within the formation of the document, it was decided to establish an interministerial committee for managing the offshore space.

31 The interministerial committee for managing the offshore space was established as part of a "policy document for Israel's offshore space". The functions of the committee are: (1) coordination between users of the offshore space; (2) implementation and update of the policy document for the offshore space.

32 Within the work of the interministerial committee for managing the offshore space, it was decided to establish a national marine center for blue innovation and economy. The center, which is intended to form a connection between entrepreneurs, academia and BlueTech entities, was launched in 2022 under Haifa's HiCenter municipal corporation.

33 The AquaCulTech innovation community was established as a cooperation between the Ministry of Agriculture, the Innovation Authority and the Israel Innovation Institute. The aim of the committee is to encourage development, testing and demonstration of innovative solutions in marine agriculture and in related fields.

34 Led by the University of Haifa and with the participation of additional research institutes. Additional information on the organization's activity is provided later in the document.

Further to these actions, and in view of the increasing interest in the field, a cooperation effort has been started between the Ministry of Innovation, Science and Technology and the National Economic Council, within which a broad thinking forum for promoting BlueTech in Israel has been established. The thinking forum convened in August-December 2022 with the participation of more than 30 entities operating in Israel's offshore space (see Figure 1), and after examining the current situation and the potential, it decided to form a specific national plan for the BlueTech field. For forming the plan, 13 topic-specific work teams spanning 3 axes were established (see Figure 2), which worked on forming the various chapters of the plan and operated under the guidance of a steering committee headed by the Ministry of Innovation, Science and Technology and the National Economic Council. The results of the teams' work were presented to the broad Thinking Forum,³⁵ and were concentrated to form a unitary National Plan for promoting BlueTech in Israel, which is presented in this document.

Figur 1: Members of the Thinking Forum for Forming the National BlueTech Plan



Figure 2: The 13 Topic-Specific Work Teams for Forming the National BlueTech Plan

Regional axis (Local Authorities)	Sectorial axis (Government Ministries)	Transverse axis (Trans-Disciplinary Topics)
1. Haifa	5. Energy	10. Regulation
2. Eilat	6. Transport	11. International cooperation
3. Western Galilee	7. Environmental protection	12. Research and development infrastructures
4. Ashdod	8. Agriculture	13. Mapping, monitoring and information
	9. Defense	

35 The list of participants in the broad thinking forum is provided in an appendix to this document.

The National BlueTech Plan: Goals and Directions of Action for Achieving Them

As set forth in the introduction chapter, there are a number of transverse barriers that impede the development of BlueTech in Israel. The barriers may be divided into two categories: (1) **a shortage in enabling infrastructures for promoting BlueTech** (research infrastructures, information and data infrastructures, financing and human capital infrastructures); (2) **the absence of an organizational framework for promoting BlueTech in Israel** (lack of coordination between dozens of entities operating concurrently in the offshore space).

In order to address these barriers, the National BlueTech Plan set two goals:

1. **Development of and providing access to enabling infrastructures for promoting the BlueTech field**
 - 1.1. Research infrastructures and regulatory infrastructure
 - 1.2. Information and data infrastructures
 - 1.3. Financing and human capital infrastructures
 - 1.4. Additional infrastructures
2. **Formation of an organizational framework for promoting the field in Israel**
 - 2.2 A specific governmental entity for promoting the field
 - 2.2 Trans-sectorial and trans-disciplinary cooperation efforts (at the/regional, national and international level)

The realization of the plan's goals will help achieve four key objectives (success metrics) for developing BlueTech in Israel:

Success metric	Existing state (2022)	Objective (2030)
Number of companies in the field	80 ³⁶	300 ³⁷
Number of large companies in the field (500+ employees)	0	3
Number of employees in the field	1,500 ³⁸	10,000
Number of global R&D centers operating in Israel	0	3

The following chapters provide a breakdown of the goals of the plan and directions of action that will allow each goal to be achieved.

³⁶ An estimate based on processing of IVC and Pitchbook data

³⁷ ² Based on the average number of companies in leading countries in the world in the BlueTech field

³⁸ An estimate based on processing of IVC and Pitchbook data

Goal 1: Development of and Providing Access to Enabling Infrastructures for Promoting the BlueTech Field

To promote offshore research and development in the industry and academia, it is necessary to provide entrepreneurs and researchers access to enabling infrastructures of a range of types (Table 2 lists the various types of infrastructures and where each infrastructure is provided a solution in the National Plan). Although the National Plan shows a broad outline for promoting BlueTech infrastructures in general, it should be noted that the directions of action that the plan offers are to be adjusted to the type of infrastructure, the target audience that the infrastructure serves (industry / academia / government) and the economic sector that the infrastructure is intended for (offshore energy / marine agriculture / sea transport / cyber / other).

Table 2: Enabling Infrastructures for Promoting the BlueTech Field

Enabling infrastructure type	Infrastructure description	Examples	Answer in the plan
Research infrastructures	“Heavy” offshore infrastructures	Research ship, undersea robot	Goal 1, Section A
	Onshore and waterline infrastructures	Laboratory, wave pool, cage farm	
	Offshore monitoring facilities	Buoy, radar	
Regulatory infrastructures	Offshore test areas	“Polygons” and the process of the use	
	Infrastructures in offshore test areas	Communication cables, electricity cables	
	Onshore rear area for offshore tests	Port operational area	
Information and data infrastructures	Databases	Wave databases (height, temp.)	Goal 1, Section B
Financing and human capital infrastructures	Financing infrastructures	Grant for pilot, academic position	Goal 1, Section C
	Human capital infrastructures	Researchers, technicians, students	
Additional infrastructures	Education and exposure to the sea infrastructures	Sea museum, aquarium	Goal 1, Section D

Goal 1. Section A: Research Infrastructures and Regulatory Infrastructures

The need for governmental assistance for building research infrastructures

Research and development activity depends on researchers and entrepreneurs having access to research infrastructures. The BlueTech field specifically is characterized by having very expensive and complex infrastructures; whether these are research ships, undersea robots or wave pools for conducting experiments, BlueTech research infrastructures tend to include a significant physical component and involve a long construction time. These characteristics make the process of constructing and operating research infrastructures slow and expensive, making the process complex (and often uneconomical) for a single academic institute or single company.

In addition, owing to the significant physical component of marine R&D infrastructures, infrastructures require a significant area, storage space and many regulatory approvals for their construction, offshore and onshore alike. For example, an entity interested in constructing a “floating” research laboratory in an offshore test area is required to negotiate a lengthy, multi-stage process and hold contacts with many entities that have differing demands.

Given this complexity, with the aim of reducing the budgetary and regulatory difficulties involved in constructing infrastructures, leading countries in the BlueTech field provide budgetary and regulatory assistance, both for creating new infrastructures and for making them accessible to researchers and entrepreneurs. Therefore, the first goal of the National Plan focuses on promoting infrastructures in general and research and development infrastructures in particular.

The current deficit in offshore research and development infrastructures

Currently, there are two key deficits involving offshore research infrastructures in Israel:

1. Existing infrastructures are not optimally utilized

- Existing research infrastructures are spread over 20 different entities, which include academic institutes, inter-university institutes, defense industry
- In the absence of national mapping of existing infrastructures, their accessibility and manner of use, and in the absence of coordination between the entities possessing them, some research infrastructures are not actually open for outside use (in general) and for use by industrial companies (in particular), for domestic and international cooperation alike.
- Also, in certain cases, existing infrastructures are not fully utilized due to a lack of professional personnel for operating them, a lack of budgets for upgrading and maintaining them (old or broken-down infrastructures) or due to a lack of specific budgets for using infrastructures (such as “sea days” on research ships).

Figure 3: the Entities Possessing Offshore Research and Development Infrastructures in Israel

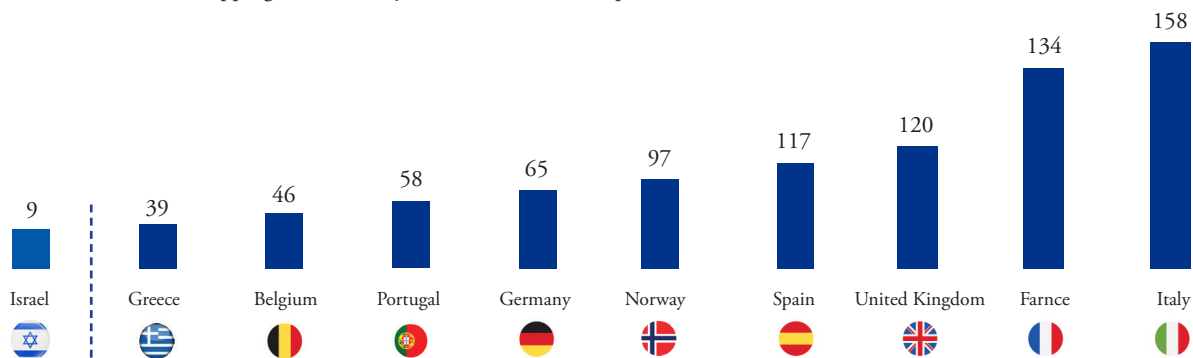


2. There is a shortage of critical research infrastructures

- Currently, Israel has a significant shortage of “heavy” research infrastructures, such as sea days on research ships³⁹, undersea implements, marine agriculture infrastructures and more. The shortage of infrastructures was identified in the “Report of the National Steering Committee for Assessing the State of Marine Science in Israel” (the National Academy of Science, 2021) as one of the key barriers to offshore research and development in Israel, as also reflected by an international comparison based on Eurocean data, showing that extent of marine research infrastructures in Israel is lower than that of leading countries in the field (see Figure 4).
- Alongside the shortage of “heavy” research infrastructures, there is a shortage of research infrastructures in zones designated for offshore experiments (“polygons”),⁴⁰ including communication infrastructures, electricity infrastructures, cranes, anchoring to the ground and more (in this case, two “preconditions” for the presence of infrastructures are as yet unfulfilled: no “polygons” for conducting offshore tests have been approved yet, and no simple, efficient process for performing tests in these zones has been defined yet either).
- Finally, it appears that there is a shortage of infrastructures in the offshore measurement and monitoring field (for example: buoys and radars along the shoreline, infrastructures in the shallow sea),⁴¹ which would allow for high-quality, continuous measurement of the sea conditions as a basis for research in the academia and for development in the industry. It should be stated that researchers and entrepreneurs report a shortage of infrastructures even at the present, and the greater the scale of academic and industrial research and development, the greater the deficit in research infrastructures is expected to be.

Figure 4: Number of Offshore Research and Development Infrastructures in Israel and Internationally

(mapping conducted by Eurocean; based on reports from countries and Eurocean’s review)



Source: Eurocean.org

To cope with the gaps described above, the national BlueTech program indicates directions of action in two channels: (1) **improving the accessibility of existing infrastructures**; (2) **developing new research infrastructures** (infrastructures in general and test areas in particular).

³⁹ For example, there is one research ship that is used by all marine research consumers and is only in partial use today due to maintenance

⁴⁰ As elaborated below, offshore test areas are currently being defined and approved within a national outline plan by the Planning Administration

⁴¹ Elaborated at length later in Chapter 1 (“information and data infrastructures” subchapter)

Sec. A.1. Improving the Accessibility of Existing Research Infrastructures

1. Mapping of all infrastructures for offshore research and development

The first step in making research and development infrastructures more accessible is mapping and publishing all infrastructures existing in Israel. The mapping will allow entrepreneurs and researchers to access a comprehensive, regularly updated and trans-disciplinary database displaying the infrastructure type, the managing institute, how to gain access to the infrastructure and the relevant contact person. As of the time of writing, there are a number of independent initiatives for mapping out infrastructures, such as infrastructures purchased by the MERCI research consortium (details below) or marine infrastructures in the Haifa region.⁴² Currently, existing mapping efforts must be consolidated into a single comprehensive database, infrastructures that have not yet been mapped are to be added and published for use by consumers in the industry and academia.

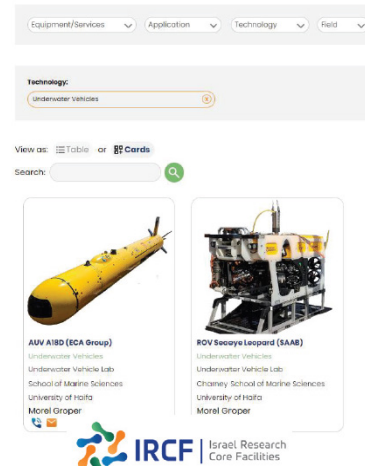
Mapping of offshore infrastructures will be done on IRCF, the national knowledge center for accessibility of research infrastructures in Israel, which was launched in December 2022 by the Ministry of Innovation, Science and Technology. The IRCF database will provide access to information on offshore infrastructures in Israel and will allow the usage of these infrastructures to be maximized.

2. Formation, regulation and simplification of processes for using existing marine infrastructures

Marine infrastructures in Israel are spread over 20 different entities in government, academia, the defense industry and in the third sector. In the absence of coordination between the entities possessing them, a major proportion of infrastructures are not actually open for outside use. In cases in which there is local cooperation involving infrastructures,⁴³ this cooperation is usually temporary and intra-academic, without being accessible to industrial BlueTech companies. This differs from the state in leading countries in the field, which offer specific plans on this issue and assist in managing, financing and providing access to offshore infrastructures for the benefit of all consumers (for details, see “Report of the National Steering Committee for Assessing the State of Marine Science in Israel” (the National Academy of Science, 2021).

Therefore, the National BlueTech Plan calls for the formation and regulation of a simple, efficient process for shared use of marine infrastructures, so that entrepreneurs in the industry will get to enjoy access to research infrastructures and knowledge and infrastructures is exchanged between the academia and industry. In the short term, the infrastructure sharing process will allow for expansion of the circle of consumers, increasing the use of existing infrastructures, but in the long term, the process will also constitute a basis for sharing of new infrastructures.

Figure 5: Marine R&D Infrastructures: Illustration (IRCF database, 2022).



⁴² Mapping that was done by the Israel National Center of Blue Economy

⁴³ For example, cooperation involving infrastructures purchased through the Mediterranean Sea Research Center of Israel (MERCI) consortium. For further information see: “Use of Joint Research Equipment and Infrastructures of MERCI”, MERCI, 2021.

Sec. A.2. Development of New Infrastructures (General)

3. Defining a central entity for identifying missing research infrastructures and recommending infrastructures requiring development

Currently, Israel has a shortage of critical marine infrastructures: “heavy” research infrastructures, infrastructures in test areas and measurement and monitoring infrastructures. This is indicated by reports by the National Academy of Science,⁴⁴ an international comparison of marine infrastructures⁴⁵ and dozens of interviews in the industry and academia.⁴⁶ The greater the scope of offshore research and development, the greater the infrastructure deficit will be. Therefore, expansion of the activity requires building new infrastructures.

The first stage in building new infrastructures is identifying missing infrastructures, while examining the gap between the predicted demand for infrastructures and their current supply.⁴⁷ Because this process is intended to identify missing infrastructures at the national level, one central entity is to perform the process,⁴⁸ consulting all relevant entities in the industry and academia as necessary and considering all needs of the system.

After identifying missing research infrastructures, each infrastructure will be examined and assessed, infrastructures will be prioritized and a recommendation will form on infrastructures requiring development. Priority is to be given to: (1) research infrastructures that may serve a large number of academic institutes and companies in the industry; (2) infrastructures that fulfill the needs of a range of sectors (marine agriculture, offshore energy and more); (3) infrastructures that have high feasibility (in terms of cost of construction, time of construction, complexity of operation, presence of skilled technical personnel, maintenance requirements and more); (4) infrastructures that are not accessible in other ways (such as through international organizations for sharing foreign infrastructures); (5) infrastructures in research fields in which Israel has a relative advantage over other countries.

4. Definition of a central entity for development of new infrastructures (purchase, operation, maintenance and accessibility)

Through to 2012, the development process of new infrastructures was usually performed on an ad-hoc basis and independently, by each of the 20 entities possessing offshore infrastructures in Israel. The lack of coordination between research institutes resulted in different institutes purchasing identical infrastructures without justification for them being possessed by more than one entity. At the same time, very costly infrastructures that were unaffordable to a single institute or company went unpurchased.

44 “Report of the National Steering Committee for Assessing the State of Marine Science in Israel” (the National Academy of Science, 2021)

45 See Figure 4

46 Examples of quotes from interviews held during the formation of the National BlueTech Plan: “Critical research infrastructures are missing. For example, there is no wet laboratory for Mediterranean shores”, “There aren’t enough sea days”, “Marine infrastructures for autonomous measurement of physical, chemical, geological and biological variables from the sea are missing”, “An operational work ship is missing”, “Argo Floats, thermos buoys, radars are missing”

47 An example of a question: “Given the foreseen demand for sea days on research ships in the next 5–10 years, and given the current research ships supply, is there expected to be a shortage of sea days? If so, to what extent? For which consumers? In which fields?”

48 The entity will be defined by the leading governmental entity in the field, as set forth at length in goal 2 – formation of an organizational framework for promoting BlueTech

The first initiative for concentrated construction of new infrastructures was in 2012, upon the formation of the MERCI organization – an academic consortium for offshore research and development infrastructures led by the University of Haifa and participated in by 12 additional research institutes.⁴⁹ The MERCI organization received onetime funding from the Planning and Budgeting Committee⁵⁰ for concentrated construction of offshore infrastructures in Israel. Through this financing, and with the help of matching by research institutes, MERCI helped the research institutes purchase infrastructures for their joint use. The process of purchasing infrastructures ended in 2016 and served as a significant waypoint in the development of marine research infrastructures in Israel. The onetime funding by MERCI was intended to assist in the stages of characterization and purchase of the new infrastructures. The operation, maintenance and accessibility aspects⁵¹ of these infrastructures remained under the responsibility and financing of the research institutes for which they were purchased. The research institutes, in turn, had difficulty providing personnel for operating the infrastructures and allocating sufficient budgets for their regular maintenance, and new infrastructures, which were purchased with great fanfare, remained only in partial use.

The National BlueTech Plan continues the sequence of actions to develop new marine infrastructures and adds to past actions in three key aspects: (1) whereas past actions focused primarily on the stages of characterization and purchase of new infrastructures, the National Plan adds explicit attention to long-term operation, maintenance and accessibility of new infrastructures too, including the resulting budgetary and organizational implications; (2) whereas past actions focused on making infrastructures accessible to the academia, the National Plan includes directions of action for increasing accessibility for entrepreneurs in the industry too; (3) whereas past actions focused on onetime efforts to promote the field, the current actions lay down a repeatable mechanism for developing new infrastructures.

Given the foregoing, the National Plan prescribes the formation of a mechanism for developing offshore infrastructures that will operate through a “Service Center” model, in which new infrastructures are purchased, operated, maintained and made accessible by a single entity. The service center for offshore infrastructures will be in charge of a regular mechanism for developing new infrastructures, which will include the following six stages: (1) receiving the missing infrastructures and recommending required infrastructures (as set forth above); (2) estimating the long-term costs for construction, operation, maintenance and affording access (fees, technical personnel and more) and getting financing; (3) building of a work plan for construction; (4) actual construction; (5) regular operation and maintenance (through professional technical personnel); (6) making the infrastructures accessible to all consumers - government, academia and industry. Within its capacity, the “service center” will be responsible for breaking down the mechanism stages into substages, which include the specific task at hand, schedules for performance, process participants and the party responsible for each task.

Naturally, the subject of development of infrastructures requires providing a constant, multiyear budget, as well as a regulated organizational framework for operating the service center/s. Therefore, the governmental entity leading the BlueTech field (presented at length in Goal 2 – “forming an organizational framework for promoting BlueTech”) will define the central entity that will be in charge of the service center for developing new infrastructures and will form a detailed multiyear plan with the Planning and Budgeting Committee for the establishment of and sustainable financing of activity in the field.

⁴⁹ The partner institutes of the MERCI Consortium: the University of Haifa, the Technion, the Hebrew University, Tel Aviv University, Ben Gurion University, Bar Ilan University, Reichman University, University of Ariel, the Open University, the Weizmann Institute of Science, Rupin Academic Center, the Geological Survey of Israel and Israel Oceanographic & Limnological Research.

⁵⁰ The initial financing from the Planning and Budgeting Committee of the Higher Education Council was for NIS 20 million. Eight years later (2020), additional onetime funding of NIS 1.5 million for maintenance of purchased infrastructures was received

⁵¹ According to the agreement, infrastructures that were purchased with MERCI financing may be used by the partner institutes at cost prices (and by non-partners at their full price)⁵¹.

5. Characterization and formation of a “sea days” fund (designated budget for sea days for researchers and entrepreneurs)

In the field of marine research infrastructure development, one of the key barriers is “*a shortage of specific research budgets [for using infrastructures], such as sea days*” (the National Academy of Science, 2021).^{52 53} In countries that are leaders in offshore research and development, one of the most common ways of providing access to expensive infrastructures is by forming a “sea days” fund, which provides researchers and entrepreneurs designated funding for sea days (access to research ships, ROV, AUV, technical diving, gliders and more).⁵⁴

Given this, the National Plan prescribes: (1) characterization of a sea days fund: defining the target audience, forming support channels, establishing volumes of support and more; (2) forming a mechanism for getting sea days based on a competitive grant for a research proposal; (3) writing of a work plan for forming the fund: key milestones, responsible party, schedules for implementation; (4) actually establishing the fund.

6. Examination of enrollment into international organizations allowing access to foreign research infrastructures

Another way of developing new research infrastructures (besides independent construction of the infrastructures) is getting access to foreign research infrastructures. Currently, there are more than ten organizations engaged in international cooperation in BlueTech related fields (most of which are operating in the European Union and financed by the Horizon program). Out of these organizations, at least five organizations deal specifically in providing access to infrastructures (see Table 3). Membership in the infrastructure organizations provides: (1) access to offshore research infrastructures in research institutes around the world; (2) access to databases; (3) access to research grants; (4) access to conferences, studies and more.

⁵² In a survey conducted by the National Academy of Science, which was intended to map out strengths and gaps in the marine science field covering 239 researchers and faculty from all institutes active in the field, the main gap that respondents stated was “a need for specific research budgets for offshore work”. Source: “Report of the National Steering Committee for Assessing the State of Marine Science in Israel” (the National Academy of Science, 2021)

⁵³ In 2018, an international committee was appointed for reviewing the MERCI research infrastructures consortium (the committee was appointed by the Council for Higher Education and the Planning and Budgeting Committee). In relation to MERCI, the committee’s main recommendations included “financing the use of heavy research infrastructures other than from ordinary research foundations (as commonly practiced in many countries)”

⁵⁴ According to the Report of the National Steering Committee for Assessing the State of Marine Science in Israel, the U.S. National Science Foundation provides research proposal winners access to infrastructures that are required for performing research. A similar model also exists in Germany, where research infrastructures are made available to proposal winners, but sometimes through an attendant application process.

Table 3: International Offshore Infrastructure Sharing Organizations – Examples of Organizations

Name of Organization	What Membership in The Organization Provides	Accessible to The Academia? To The Industry?
EMSO-ERIC	<ul style="list-style-type: none"> • Access to research infrastructures in the oceanography field • Use of technologies for analyzing observations • Access to databases for the academia and industry 	Academia and industry
EURO-ARGO ERIC	<ul style="list-style-type: none"> • Access to an array of approximately 800 buoys measuring temperature and salinity • Access to real time data in climate change fields 	Academia and industry
IODP	<ul style="list-style-type: none"> • Access to research infrastructures, scientific drilling operations in the oceans (such as research ships) • Enrollment in international research delegations • Access to a database and collected samples 	Academia
Eurofleets+	<ul style="list-style-type: none"> • Access to offshore tools at research institutes around Europe • Real-time access to marine data • Participation in joint research rounds 	Academia

As of the time of writing, Israel is a member of one infrastructures organization – EMBRC: the European Marine Biological Resources Centre (see Figure 6). Israel is represented in the organization by the Ministry of Innovation, Science and Technology and the Inter-University Institute in Eilat. As part of the membership in the organization, Israeli researchers gain access to research infrastructures that do not exist in Israel in the marine biology field.

To extend its reach to additional fields, the National Plan has three directions of action: (1) mapping of relevant international organizations, prioritization of organizations while considering the value offered by joining it (such as whether the organization provides access to necessary infrastructures that do not exist in Israel) and the degree of feasibility of enrollment (admission conditions, cost),⁵⁵ and a decision on whether to enroll into an additional infrastructure organization; (2) definition of the resources required for cooperation; (3) promotion of actual cooperation.

⁵⁵ This is done in consultation with experts in the field and in relation to the contribution to basic research / applied research / development in the industry

Figure 6: EMBRC – Sharing of Marine Biology Infrastructures



These directions of action and additional directions pertaining to the field of cooperation efforts in general are discussed at length later in the plan, under Goal 2: “formation of an organizational framework for promoting BlueTech”, [International Cooperation Efforts](#)” section.

Sec. A.3. Development of New Infrastructures (in the Offshore Test Areas – “Polygons”)

To develop the BlueTech field, it is necessary to allow entrepreneurs and researchers to conduct tests in offshore test areas. Research in the open sea allows entrepreneurs (and researchers) to test out their products (and hypotheses) under conditions that cannot be recreated using other infrastructures (such as a research ship or onshore and waterline laboratory). Alongside the unique benefits that research in the open sea has to offer, it poses distinct regulatory difficulties, both at the stage of getting approval for an experiment and in actually performing it.

Therefore, the plan includes a number of specific directions of action for facilitating the process of approving and conducting open sea studies. To allow offshore tests to be performed, four conditions (see Table 4) must be fulfilled. The following pages specify directions of action in relation to each condition.

Table 4: Conditions for Performing Offshore Tests

#	Condition for performing offshore tests	Direction of action in the National Plan
1	Existence of polygons for offshore tests	7. Completion of the process of defining and approving polygons for offshore tests
2	Existence of a process for approving and performing tests	8. Forming and inaugurating an efficient process for approving and performing tests
3	The presence of research infrastructures in polygons	9. Constructing and operating infrastructures in polygons
4	The existence of a logistic rear area for offshore tests	10. Locating and allotting operational areas in ports

7. Completion of the process of defining and approving polygons for offshore tests

The first and main barrier to performing offshore tests is the absence of defined areas in which tests may be performed, including the use of permanent offshore installations. To solve the problem of the shortage of test areas, the Planning Administration has formed National Outline Plan (NOP) 13C, within which it has defined 8 polygons for offshore tests.⁵⁶ The process of approving the plan is underway⁵⁷ and is expected to end in 2024.

Given the national need for designated offshore test areas, the National BlueTech Plan emphasizes the urgency of successfully completing the process of approving the polygons, while striking a balance between advancing research and development and protecting the marine environment.

⁵⁶ Test areas in Israel's sovereign waters that have diverse characteristics (such as: deep / shallow sea), which are suitable for a range of offshore tests.

⁵⁷ As of the time of writing, the stages remaining for approving NOP 13C are: (1) a discussion at the National Planning and Construction Committee; (2) publishing the plan for public comments; (3) discussion in the subcommittee for conceptual planning issues in the Planning Administration; (4) approval of the National Council; (5) passing a Government resolution.

8. Forming and inaugurating an efficient process for approving and performing offshore tests

The existence of a defined offshore test area is an essential condition for performing actual tests, but is not sufficient by itself. Even after the NOP 13C plan is approved, entrepreneurs and researchers will not be able to perform tests if no process for approving tests in polygons has been laid down. Therefore, the National Plan prescribes the formation of an efficient, simple and clear process for approving and performing tests, which will provide researchers and entrepreneurs clarity, in terms of the requirements of the process and in terms of the service times.

In the “existing state” scenario (i.e., if there is no regulatory change on the matter of approving and conducting tests), it will not be possible to perform actual tests because of the complexity of the process (see Figure 7).

Figure 7: “Existing State” – Process for Approving and Performing Tests Based on the Use of Existing Regulatory Tools Only



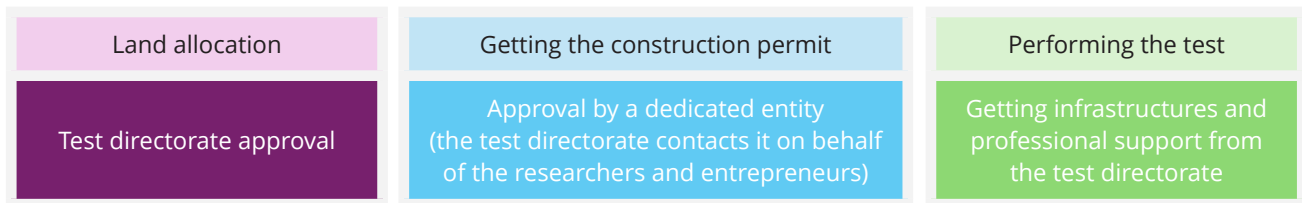
(A) Land allocation: at the first stage of the test approval process, the entrepreneur or research will be required to contact the Israel Land Authority (ILA) to get an allocation of offshore land. To this end, the ILA may demand a professional opinion from the ministry relevant to the field of the test (for example, Ministry of Energy Chief Scientist approval for a wave energy test). (B) Getting a construction permit: at the next stage, researchers and entrepreneurs will be required to contact two separate entities to get a construction permit: (I) contacting the Coastal Environment Protection Committee, which will examine the effect of the test on the marine environment, the appearance of the shoreline and other aspects; (II) contacting the district licensing authority, which will examine the details of the test. (C) Conducting the test: finally, researchers and entrepreneurs will be required to build infrastructures in the open sea using their own resources – connection to electricity, connection to communication, anchoring to the ground, building of cranes, installing monitoring tools and more.

This process will impede the performance of actual offshore tests. Researchers and entrepreneurs will have to contend with: (1) a long, multistage process; (2) being in contact with many entities that have different demands; (3) independently constructing expensive, complex infrastructures in the open sea. Therefore, within the National Plan, two possible options have been formed for an improved process for approving and performing tests:

Option 1 – establishing an offshore test directorate: under this option, a specific offshore test directorate will be established (or appointed), which will support researchers and entrepreneurs throughout the process. Instead of independently contacting different entities with diverse demands, researchers and entrepreneurs will only need to contact the test directorate, which will serve as a single point of contact in the test performance and approval process. At the same time, a number of changes will be made in the process itself. The process, according to option 1, is to include the following three stages (see Figure 8): (A) allocation of territory: the researchers and entrepreneurs are to apply to the test directorate for being assigned land to perform the test. The test directorate,

in turn, will allocate the territory for the tests by itself (to which end the Israel Land Authority will provide the test directorate authorization to allocate territory in polygons independently); (B) getting the construction permit: at this stage, the test directorate will represent the researchers and entrepreneurs in the construction permit issuance process. The permit issuance process, in turn, will be updated: instead of the two entities that are required for issuing construction permits today (the Coastal Environment Protection Committee and the district licensing authority), a single, special purpose entity will be used, which will examine all requirements for issuing a construction permit;⁵⁸ (C) performing the test: at the last stage, the test directorate will provide the researchers and entrepreneurs the required research infrastructures in polygons, such as an electricity connection, communication connection and so on (details appear on the next page – “construction and operation of infrastructures in polygons”). Also, the test directorate will assist researchers and entrepreneurs in performing the test itself (on-site professional support, providing access to current marine data on the polygon’s environs and more).

Figure 8: Process for Approval and Conducting Tests, According to Option 1 – Formation of an Offshore Test Directorate



Compared to the “existing state” scenario, the process being offered in Option 1 is simpler (researchers and entrepreneurs work with just one contact person) and more efficient (fewer parties involved in the process). However, the researchers and entrepreneurs are still required to get a permit from an additional outside entity besides the test directorate.

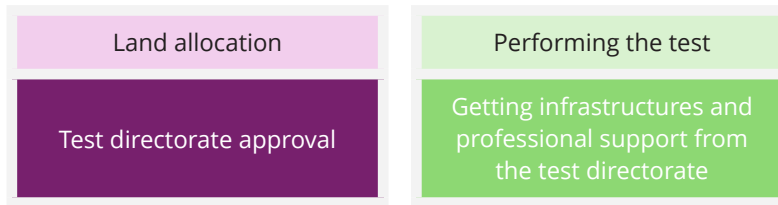
Option 2 – forming an offshore test directorate + removing the requirement for a construction permit in

polygons: option 2 is identical to option 1, with one significant variation – defining the polygons as designated areas that do not require construction permits.⁵⁹ This option is similar to the practice in other fields of research and development (for example, in the construction research test laboratory in the Technion, new construction methods can be tested without having to get a specific construction permit for the testing). Under option 2, the process will consist of just two stages – allocation of territory and performing the test (see Figure 9). Compared to option 1, the process being offered includes just one entity (the test directorate), which helps approving and conducting tests from end to end.

⁵⁸ These include environmental requirements, security requirements, requirements related to the test specification and requirements in other fields.

⁵⁹ Applying the exemption to small installations only, or to all installations (small, medium and large) may be considered. In each scenario, it is necessary to make sure that there is a coordination apparatus that replaces the coordination actions that are conducted under a construction permit.

Figure 9: Process for Approving and Performing Tests, According to Option 2 –
Formation of a Test Directorate + Removing the Requirement for a Construction Permit



Naturally, each option has budgetary, organizational and regulatory implications. The governmental entity leading the BlueTech⁶⁰ field will examine the options and will transform the selected option into a practical work plan. The aim here is to implement the test approval process in as early as 2024 (at the time of approval of the polygons).^{61 62}

In addition, the governmental entity will examine the need to form a simple, uniform regulatory protocol for approving tests other than in fixed installations (i.e., tests in the open sea, under varying conditions of distance from the shore, depth, currents and wind direction).

9. Construction and operation of infrastructures in polygons

As mentioned, a significant proportion of tests performed in the open sea require supporting infrastructures in the test area, such as electricity and communication connections, anchoring to the ground, construction of cranes and installation of tools for monitoring marine data. Usually, these infrastructures are expensive and complex and have to serve many entities, but no single institute or company can afford them.⁶³

To allow offshore tests to be conducted, the National Plan prescribes the construction and operation of infrastructures in polygons, which will be made accessible to researchers and entrepreneurs for a limited time and in exchange for payment. The process of construction of the infrastructures in polygons will be managed by the offshore test directorate described above, and will be largely similar to the process for developing new offshore infrastructures in general (see “Definition of a central entity for development of new infrastructures (purchase, operation, maintenance and accessibility”). In particular, the research infrastructures in polygons will be matched to the expected extent of the offshore tests, and will allow for tests to be conducted in a range of fields and for all consumers.

⁶⁰ Shown at length in goal 2 – “formation of an organizational framework for promoting BlueTech”

⁶¹ Alongside the process for approving and performing offshore tests in general, a specific process for tests using autonomous watercraft must be formed. As of the time of writing, Israeli regulation does not permit operating autonomous watercraft in Israel’s waters – or Israeli autonomous vessels in foreign offshore areas. To allow for tests to be performed using autonomous vessels, these vessels must be addressed in the existing regulations, and an “offshore corridor” for tests in this field must be formalized.

⁶² Besides the 8 polygons being offered in National Outline Plan 13C, the application of the process to the offshore area off Michmoret Beach, which is designated for marine agriculture research and development activity, is also to be examined. This is to be done with the cooperation and consent of all stakeholders.

⁶³ Both at currently existing ports and ports that will be built in the future. It should be noted that an area in Haifa Port and another in Ashdod Port are already approved for tests in existing plans and are also included in National Outline Plan 13C.

When deciding on the development of infrastructures in polygons, the test director will see whether it is necessary to develop all infrastructures in all polygons or only in some of them (for example, laying of electricity cables for specific polygons only).

10. Locating and assigning operational areas in ports as an onshore rear area for offshore tests

The first condition for performing offshore tests is the existence of operational areas in ports that will serve as a logistic rear area for offshore tests and for docking of vessels, storage of equipment, research centers, laboratories, running of tests and for other research purposes (in Yafo Port, for example, an operational area used as a specific complex for offshore energy tests has been defined).

Therefore, the National Plan prescribes: (1) locating potential port areas, which: (1A) are not in use at the current stage; (1B) are located near the test areas within NOP 13C; (1C) can serve research purposes in a range of sectors; (2) evaluation of potential areas and recommendation of selected areas to be repurposed; (3) forming understandings with all stakeholders (the Shipping and Ports Authority, Israel Ports Company, the port management) on the repurposing of selected areas; (4) forming a work plan for allocating the selected areas, including budgetary, regulatory and environmental implications.

Goal 1. Section B: Information and Data Infrastructures

Broad mapping of marine information and making it accessible through a readily available, high-quality database constitute a basic foundation for broad development of the BlueTech field.⁶⁴ Through its National BlueTech Plan, Israel joins leading countries in the field⁶⁵ and prescribes the expansion of the marine monitoring array and making it accessible through a free to use national database, for all consumers in the industry, academia and Government. A breakdown of the current situation in the information and data infrastructures field, key gaps in the field and directions of action for solving them is provided below.

The current situation – information and data infrastructures for offshore research and development

Currently, most offshore monitoring activity is conducted by Israel Oceanographic & Limnological Research,⁶⁶ and includes the use of a wide range of marine tools spread along the state's shores. Geographically speaking, most monitoring tools are located (1) in the deep sea (and less in shallow waters); (2) off Haifa's shores (and less near other port cities).

⁶⁴ Comprehensive, continuous measurement of the sea is an essential condition for industrial development, academic research and activity in the Government ministries. Research in offshore test areas ("polygons") without current data on the polygon's environment (height of waves, water temperature) is akin to medical research without data on the patient's environment (patient height and body temperature, but also family medical history, predisposition to hereditary

⁶⁵ For example: Copernicus Marine Service, the European Union's marine database (funded by the European Commission). The database provides access to current, comprehensive information on chemical, physical and biological data in the marine environment, at no cost. General information about the database appears on the Copernicus website, alongside details on the interfaces that it contains (Ocean Visualization, Ocean Monitoring, In Situ Dashboard and more).

⁶⁶ Israel Oceanographic & Limnological Research is a governmental sea and lake research company, which answers to the Ministry of Energy. Although most offshore monitoring activity in Israel is managed by Israel Oceanographic & Limnological Research, other research entities perform other activities. For example, the University of Haifa operates an offshore research station in Sdot Yam (the Moris Kahn Station) and two floating stations whose data is transferred to the general public at the University of Haifa's Themo website (Texas A&M – University of Haifa East Mediterranean Observatory). Additional gathering apparatuses are managed by the Ministry of Defense, the Mediterranean Coast Cliffs Preservation Company, natural gas producers, satellite companies, the CAMERI Coastal and Marine Engineering Research institute Ltd. and other entities.

Some of the data gathered by the monitoring tools are made accessible using ISRAMAR, an online database managed by Israel Oceanographic & Limnological Research. The ISRAMAR database includes forecasts of waves, currents, temperature, salinity and tides, alongside data on lighting, wind, turbidity and more. ISRAMAR data is based on offshore sensors and is usually frequently updated. Other data, in contrast, is gathered at lower frequency, based on gliders,⁶⁷ satellite data⁶⁸ and deep sea voyages.⁶⁹ This data, which includes information about the physical, chemical and biological conditions in the open sea, allows for periodical analysis in diverse research and development fields. However, the data is not constantly accessible to all consumers.

As set forth, data consumers are divided into three target audiences:⁷⁰ research entities, industrial companies and Government ministries. The target audiences, in turn, are divided into economic sectors (such as companies in the marine energy / marine agriculture / maritime transport field), each economic sector needing a different type of knowledge: whereas offshore energy companies may need marine models for predicting waves and currents, maritime transport companies are expected to be interested in comprehensive information on the seabed's structure. Despite the many differences between the different target audiences and economic sectors, all consumers share a common denominator of a need for a broad, reliable and readily available database.

Key gaps in information and data

Notwithstanding intense activity in the offshore monitoring field, there are still three gaps requiring attention within the National Plan:

1. Partial solution for shallow sea monitoring

According to Israel Oceanographic & Limnological Research and a range of researchers in the marine science field, the current monitoring apparatus must be expanded to provide a sufficient solution for the coastal area and the shallow sea area. This is in order to allow for expansion of research and development activity in shallow waters, improve understanding of climatic processes near the shore, increase the readiness for climate change and help provide solutions to emergencies in coastal regions.

2. Lack of a solution for monitoring the offshore test areas ("Polygons")

An essential condition for conducting tests in polygons is access to marine data about the polygon's environs. To plan and perform test activity, researchers and entrepreneurs must refer to a detailed map of the seabed in the test area, data on obstacles / hazards that may affect the conduct of the test, the biological ecosystem that must be protected during the test, data on currents and waves that may affect research results, the water temperature, wind data and more. However, despite the progress in National Outline Plan 13C (which defines areas for performing offshore tests),⁷¹ no apparatus has been formed yet for monitoring the marine environment in the test areas.

67 Glider = a marine glider; an autonomous, undersea and unmanned vessel for sea and ocean research.

68 In other databases, satellite data on the offshore space is extensively and continuously available. This data may be leveraged (and cross referenced with other information sources) for many uses: chlorophyll mapping, identification of offshore pollution, monitoring sediment movement and more.

69 However, it should be noted that continuous data is also gathered in the open sea using buoys.

70 A fourth target audience may be included – the general public. According to Israel Oceanographic & Limnological Research data, each year, the ISRAMAR database is contacted about a million times, inter alia for bathing and sea sports purposes.

71 See "completion of the process of defining and approving polygons for offshore tests" above.

3. Lack of a national database (a broad, reliable and available database that consolidates all marine data gathered in Israel)

Currently, several entities are concurrently operating to gather marine data and maintain their own databases, which are not interconnected with each other. Out of these, a few databases are made accessible at the national level and national do not contain all marine data gathered in Israel.

Specific directions of action for information and data infrastructures

11. Expansion of the monitoring array in the shallow sea

The National Plan prescribes the formation of a detailed work plan for forming a high resolution shallow sea monitoring array. To this end, Israel Oceanographic & Limnological Research will devise a multiyear plan to expand national monitoring to shallow waters by 2025. It will do so while examining the ability to combine independent monitoring tools besides those used today (in particular, integrating data from undersea robots, drones and satellites) and comparing with the need to build additional monitoring stations in the deep sea.⁷²

12. Establishing a monitoring array in polygons (preliminary monitoring and continuous monitoring)

To provide an answer to the expected requirements for marine data in polygons, Israel Oceanographic & Limnological Research will set up an array for monitoring the offshore test areas in two aspects: (1) preliminary monitoring – initial and preliminary surveys of polygon areas, including detailed geographic information layers and characterization of the oceanographic conditions existing in and around the polygon; (2) current monitoring – establishing an apparatus for continuous monitoring of marine parameters in real time within the limits of the polygon and long-term operation of the apparatus (including regular servicing and maintenance).

13. Establishing a free to use national marine database, accessible to the Government, academia and industry

To permit academic, industrial and governmental use of data gathered using public monitoring tools, a unitary database that combines all marine data available in Israel must be established. The national database will draw data from all existing information sources (including: Israel Oceanographic & Limnological Research, universities and research institutes, Government ministries, third sector organizations and others), will gather the data into a unitary geographic interface and will make a free to use, comprehensive, continuous and reliable database accessible to all stakeholders.

⁷² When forming the plan, it must be ensured that the data gathered is of a quality standard that is valuable for a wide range of research types.

Goal 1. Section C: Financing and Human Capital Infrastructures

Two basic conditions for research and development are the existence of a sufficient budget for performing research actions (in the academia) and for development of products and services (in the industry), and the availability of professional personnel for operating and supporting these actions. To this end, the National BlueTech Plan includes directions of action for expansion of financing and human capital infrastructures in offshore research and development in all fields: (A) Government:

14. Expansion of the financing for offshore research and development at Government ministries; (B) Academia:

15. Expansion of human capital financing and development channels in universities, colleges and research institutes; (C) Industry:

16. Encouraging the seeding of new startup companies and development projects in existing BlueTech companies.

Goal 1. Section D: Additional Infrastructures: Education and Exposure

The development of a broad ecosystem in the BlueTech field requires a critical mass of researchers and entrepreneurs operating on a regular basis in the offshore innovation field. To increase the number of researchers and entrepreneurs in the long term and produce the “next generation” of BlueTech in Israel, it is necessary to make sure that infrastructures for marine education and for showcasing the marine world are in place. These infrastructures are “softer” than research boats and telescopes, but have a possible effect on the ecosystem in the long term.

17. Expansion of exposure to the sea and offshore innovation

To this end, the National Plan prescribes the formation of a specific outline for expanding exposure to the sea and marine innovation. Within the outline, a number of possible directions of action for implementation at the national, regional and local level will be formed, including: (1) forming “marine education” programs in the education system; (2) defining a national “Sea Day”; (3) establishing sea museums, aquariums and offshore innovation centers for the benefit of the general public. Within the outline, specific attention will be given to involving industrial and academic entities in directions of action, with the aim of making sure that these entities contribute to the apparatus but also benefit from it (for example, BlueTech entrepreneurs will get to use the new infrastructures that will be built for performing pilots).

Goal 2: Forming an Organizational Framework for Promoting the BlueTech Field in Israel

Goal 2. Section E: A Designated Governmental Entity for Promoting the Field

As of the time of writing, there are approximately 30 entities operating in Israel's offshore space, directly or indirectly involved in promoting offshore research and development. In the absence of an apparatus for integrating activity in the field, these entities operate independently, without pooling of resources, without on-site coordination and without any agreement as to a common vision or uniform goals.

The National BlueTech Plan constitutes the first step in connecting all players operating in the offshore space – Government ministries, higher education institutes (universities, colleges and research institutes), BlueTech companies in the industry, third sector organizations, defense companies and many other entities. The second step in the connection process (elaborated on the following pages) is forming a fixed organizational framework for promoting BlueTech in Israel, which will operate in cooperation with all target audiences (Government / academia / industry), all economic sectors (energy / agriculture / transport / environmental protection / defense and others) and all local authorities relevant to the field.

18. Appointment of a governmental entity for leading the BlueTech field

Given all these, the National Plan prescribes the appointment of a governmental entity for leading the BlueTech field, which will be entrusted at the national level with integration, promotion and review of all aspects related to BlueTech. The entity's responsibilities will be based on the "directorate" model used in other national plans ⁷³ and will include the following functions:

- Promotion of tasks established in the National Plan
- Periodical review of the implementation of the National Plan, identification and resolution of significant barriers
- Forming a work plan for the formation / appointment of entities for promoting specific BlueTech subjects, including:
 - Defining a central entity for identifying missing infrastructures and defining a central entity for developing new infrastructures (a "service center", as set forth in Goal 1, "research infrastructures" chapter)
 - Defining a designated entity for managing the approval process and performance of offshore tests in test areas ("offshore tests directorate", as set forth in the direction of action "Formation and adoption of a process for approving and conducting offshore tests")
 - Formation of a plan for establishing / appointing a "marine tests directorate", which will include the directorate's purpose, functions, organizational structure, required functions, financing structure, the entity in which the directorate will operate and more

⁷³ The formation of a directorate for integration and performance of a National Plan is common practice for multiannual promotion of governmental policy. For example, integration and execution of the national smart transport plan (Government Resolution 2316) was assigned to the "smart transport directorate" of the Prime Minister's Office. According to the Government resolution, the smart transport directorate is in charge of: (1) coordination of the national smart transport plan; (2) assistance in creating performance tracking and objective metrics; (3) making sure that the plans that are implemented within the plan match the purposes prescribed in the resolution. Additional examples are a designated directorate that was formed in the Ministry of Agriculture for implementing Government Resolution 1442 (multiannual plan for development of the city Eilat and the Eilat region as an international hub for producing seafood) and the climate change preparation directorate in the Ministry of Environmental Protection (Government Resolution 4079 – Israel's preparations for adjustment to climate change: implementation of the recommendations for a national strategy and action plan)

- Regular coordination between the National BlueTech Plan and specific plans in Government ministries and local authorities
The Council for Higher Education's marine science program, the plan of the Ministry of Agriculture for developing Eilat-Eilot as an international hub for seafood, the work plan of the National Blue Innovation and Economy Center in Haifa, the National Plan for preparation for climate change, the National Plan for monitoring the Mediterranean Sea, the work plan of the Mediterranean Coast Cliffs Preservation Company, activity of interministerial committee for managing the offshore space, the work plan of the marine agriculture innovation community and more
- Promotion of regular connections between the industry, Government and academia
Regular assistance and support for BlueTech entrepreneurs in the industry, forming connections between BlueTech companies and academic institutes and Government ministries, promoting research and development complexes, encouraging the formation of companies and more.
- Periodical examination of national policy in the BlueTech field and updating it accordingly If necessary, forming specific plans in the fields of blue economy, marine training and more
- Formation and implementation of trans-sectorial and trans-disciplinary cooperation efforts (elaborated in the next section)

Goal 2. Section F: Trans-Sectorial and Trans-Disciplinary Cooperation Efforts (at the Regional, National and International Level)

Within its activity, the governmental agency leading the BlueTech field will promote trans-sectorial and trans-disciplinary cooperation efforts at three levels: (1) regional cooperation efforts; (2) national cooperation efforts; (3) international cooperation efforts.

Regional Cooperation

19. Development of regional specialty hubs ("clusters")

The first level at which cooperation efforts must be advanced in the BlueTech field is at the regional / municipal / local level. To this end, the governmental entity leading the BlueTech field will assist in the development of existing specialty hubs (for example: Haifa, Eilat-Eilot) and in the formation of new regional specialty hubs (for example: Ashdod, Western Galilee Cluster) and will offer professional, budgetary and regulatory assistance for activity being formed in the specialty hubs. This assistance will involve coordination between the National BlueTech Plan and local plans for developing the field.

As of the time of writing, the most developed regional specialty hub is the cluster that is forming in the city of Haifa, under the leadership of the National Blue Innovation and Economy Center." Within its activity, the center assists in promoting cooperation in the BlueTech field in the city, connecting "all research, academic, infrastructure, logistics, defense industry, nature preservation and innovation entities operating in Haifa and its adjoining offshore space."⁷⁴

74 "Review of the Blue Economy in Israel – Existing State and Opportunities", Ehud Gonen (University of Haifa), 2022

The cooperation efforts allow for creation of synergy between the entities operating in the city and forming a local ecosystem in offshore research and development, which includes BlueTech companies, administrative entities (the Israel Shipping and Ports Company, the National Marine Environment Protection Unit), defense-related technology centers (Rafael, Elbit, Israel Navy), ports (Haifa Port, Haifa Bay Port and Israel Shipyards Port), research institutes (the Technion, CAMERI, Israel Oceanographic & Limnological Research, University of Haifa), companies in the offshore industry (shipping, offshore logistics) and marine education entities (the National Maritime Museum, the Israel Navy Museum, Hecht Museum).⁷⁵ Currently, the National Blue Innovation and Economy Center is supporting dozens of entrepreneurs in the BlueTech field, providing assistance in formation, locating financing channels, access to test sites, connection to research institutes and additional professional aspects.

Figure 10: Summary of Academic Institutes, Industrial Entities and Offshore Infrastructures in Haifa Bay⁷⁶



An additional regional specialty hub is currently being formed in Eilat. In May 2022, Government Resolution No. 1442 was passed for operating a multiyear plan for developing the city Eilat and the Eilat Regional Council for achieving significant improvement in the quality of life of residents of the region, through: (1) development of growth engines, innovation and ability to produce food from sea and desert sources; (2) turning the city and region into a national and international center for research and development of marine biotechnology and water and desert agriculture. Within the resolution, a marine agriculture park will be established at multiple sites in the Eilat-Eilat region (plant nurseries, Amram and the Evrona region), an industrial zone for hosting agricultural entrepreneurs, companies and manufacturers will be established (Evrona) and a range of additional actions in the field will be promoted.⁷⁷

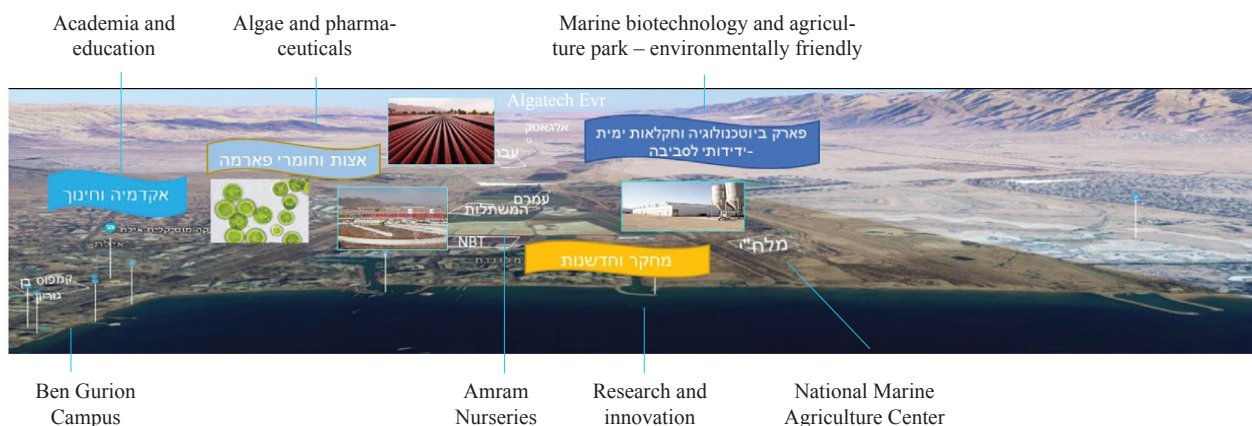
75 "Review of the Blue Economy in Israel – Existing State and Opportunities", Ehud Gonen (University of Haifa), 2022

76 As of 2022. Source: the National Blue Innovation and Economy Center.

77 A list of the actions within the resolution: (1) promoting a marine agriculture and sea food and products park – (1A) a work plan for development of infrastructures in the marine agriculture park; (1B) assistance in financing the development of infrastructures in the nurseries site; (1C) treating the water discharged at the nurseries site; (1D) financial assistance for agricultural producers (grants); (1E) promoting a combined agriculture industrial zone in the Evrona space; (2) promoting an educational and academic ecosystem in the region – (2A) establishing an international school educational program; (2B) promoting academic research and teaching in the field; (2C) promoting a program for academia-industry cooperation ("Nitzan"), alongside prioritization of research in Eilat-Eilat on the content domains of the resolution: (2D) establishing a designated directorate in the Ministry of Agriculture; (2E) the BARD foundation – promotion of marine and desert biotechnology and agriculture; (2F) upgrading the National Marine Agriculture Research Center; (2G) "support center for boosting entrepreneurs" service laboratory; (2H) branding in international conferences; (3) encouraging innovation in marine biotechnology and agriculture in the region, promotion of initiatives and pilots. The resolution's budget: approximately NIS 170 million (for 5 years).

For integrating and implementing the resolution, a designated directorate has been established under the Ministry of Agriculture. The planning processes in the directorate are currently underway, and in the coming months a multiyear plan for forming the new cluster will be published – marine agriculture in Eilat.

Figure 11: the Educational and Academic Ecosystem in Eilat-Eilat: Marine Agriculture and Marine Biotechnology⁷⁸



Recently, two additional regional specialty hubs in the BlueTech fields have been examined: (1) Ashdod; (2) Western Galilee Cluster. In December 2022, the Industrial Development Division of the Municipality of Ashdod published a proposal for positioning Ashdod as a BlueTech and blue economy hub, which would “utilize Ashdod’s advantages for developing a distinct, significant ecosystem offering added value.” Such a proposal would be based on: (1) the activity of the innovation apparatus at Ashdod Port, which supports the development and formation of startup companies and provides them unique test infrastructures and optimal conditions for making the transition from concept to product. To date, the innovation apparatus has hosted more than 60 startup companies in various port fields, including supply chain, energy, safety, cyber and more; (2) the existence of an approved municipal construction plan for marine agriculture off Ashdod’s shores; (3) the existence of infrastructures supporting BlueTech activity in the city – desalination facility, fish growing cages, marina, naval base, private port, free areas for onshore infrastructures and more. According to the proposed plan, positioning Ashdod as a regional specialty hub will include: (1) forming of a multiyear plan for development of the municipal ecosystem in the field; (2) establishing a specialized BlueTech research and development center ⁷⁹ (using the incubator model); (3) forming a marine training and marine education apparatus in the city (research institutes and stations, marine engineering study units at academic institutes the city, “sea parks”, marine schools and more).

78 2022

79 The construction of a unique center that will operate using an incubator model and will provide a range of enabling conditions for BlueTech companies, including: (1) access to the sea, to ports and an approved municipal construction plan for marine agriculture research and development; (2) rapid access to a range of test sites; (3) acceleration plans; (4) access to financing channels; (5) conferences, training programs and community events.

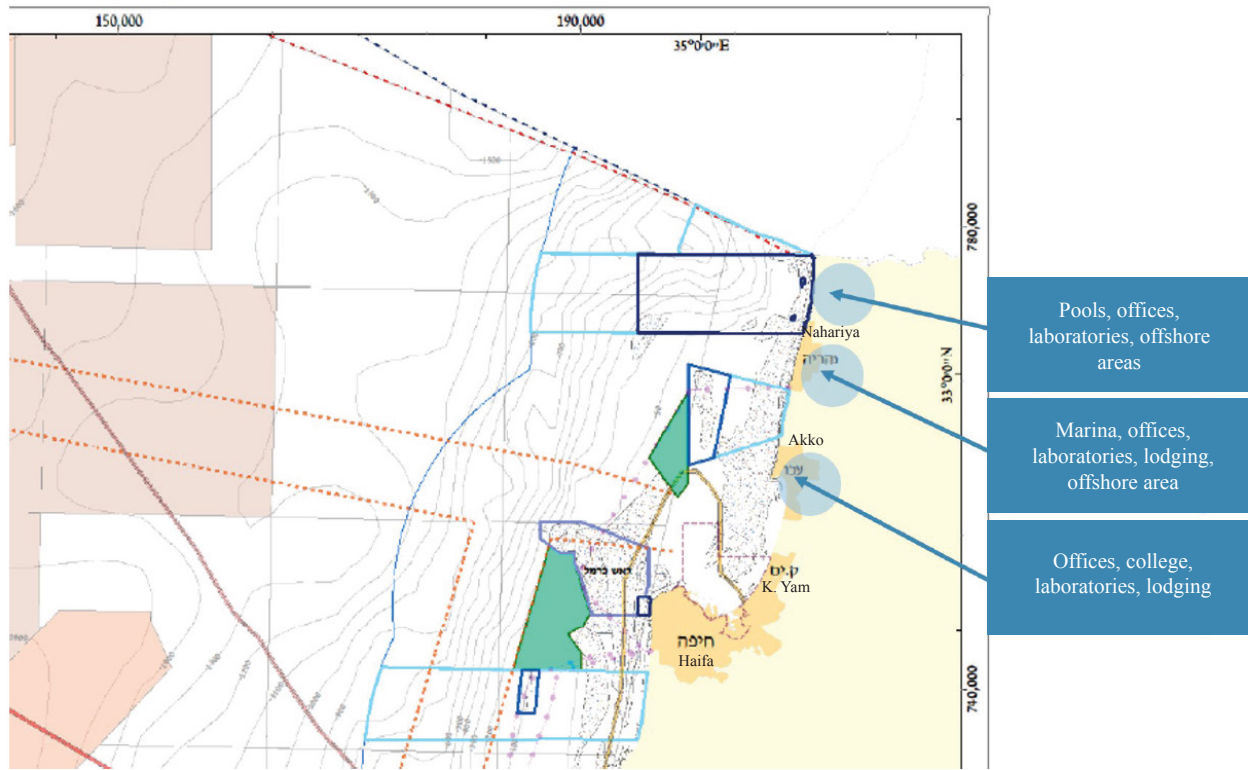
Figure 12: Ashdod as a Regional Specialty Hub in the BlueTech and Blue Economy Field: Existing and Proposed Sites⁸⁰



In December 2022, a proposal was published for an additional specialty hub in the BlueTech field – the Western Galilee Cluster. In 2022, a strategic master plan for the Western Galilee region was published, led by the Ministry of Construction and Housing, the district planning and construction committee, the Western Galilee Cluster and mayors of authorities in the cluster. The master plan, which treats the sea as a continuous part of the onshore space, points out a number of unique assets for developing BlueTech in the cluster: (1) Akko – marina, fishing dock, declared marine agriculture zone, Western Galilee College, the Marine Training Institute, School for Naval Officers; (2) Nahariya – approval for construction of a new marina, an industrial park in Nahariya; (3) the presence of grounds for an onshore rear area, existing activity of BlueTech companies and marine industry centers. To leverage the assets unique to the cluster, a conceptual proposal has been published for building a BlueTech research and development center in Western Galilee, which will constitute a leading knowledge body in the field, while positioning Western Galilee as an international leader in research, development and promotion of innovation in BlueTech. The aims of the center are promoting applied research in diverse BlueTech fields, use as a knowledge center for public and business entities and making test sites accessible to companies in the industry.

⁸⁰ source:

Figure 13: Conceptual Proposal for Construction of a BlueTech Research and Development Center in Western Galilee⁸¹



Naturally, the proposed plans in Ashdod and in the Western Galilee Cluster will be able to use supporting governmental policy (such as supporting and promoting research and development, providing financial incentives and assistance in regulation, licensing, land and additional fields). To this end, the governmental entity leading the BlueTech field will examine the plans being proposed for promoting new regional specialty hubs, and if necessary will provide professional, budgetary and regulatory support to the relevant parties.

⁸¹ Source: Planning Department, Western Galilee Cluster.

National Cooperation Efforts

20. Formation of interfaces for transfer of knowledge and information between the Government, academia and industry

To encourage cooperation efforts between entities operating in the BlueTech field at the national level (such as Government ministries, industrial entities and academic institutes), the governmental agency leading the BlueTech field will examine, form and establish work interfaces for exchange of knowledge between the sectors⁸², including: (1) establishing specific communities for offshore innovation;⁸³ (2) establishing incubators and boosters⁸⁴ in public bodies; (3) forming permanent national forums for cooperation (for example – a national BlueTech conference); (4) coordinating and providing access to a pool of experts (academic and third sector) and professional support for BlueTech companies.

International Cooperation Efforts

Besides regional and national cooperation efforts, collaboration should also be promoted with academic and industrial entities in leading countries in the field, which offer a number of unique opportunities for Israel's BlueTech, including: (1) gaining access to infrastructures that are in short supply; (2) gaining access to advanced knowledge and databases; (3) expansion of financing channels for studies and trials; (4) increasing international awareness of Israel as a leader in the scientific-technological front; (5) an opportunity for Israeli researchers and entrepreneurs to produce joint activity with their counterparts in leading countries in the field; (6) “opening of doors” to the Israeli BlueTech industry.

The directions of action for promoting international BlueTech cooperation are divided into two channels: (1) scientific cooperation:⁸⁵ (1A) joining international BlueTech organizations (such as: scientific research infrastructure sharing organizations); (1B) use of existing bilateral agreements for studies in the BlueTech field; (2) industry-oriented cooperation:⁸⁶ signing of agreements with foreign innovation authorities, supporting Israeli companies in securing funding for trials, joining of industry-oriented organizations and more.

1.1. Joining international BlueTech organizations

As of today, more than 10 organizations⁸⁷ deal with international cooperation in the BlueTech field⁸⁸. Most of the organizations operate within the European Union and using Horizon financing (the union's research and development program). Also, most of them have a specific focal topic (such as marine biology) and

⁸² At the same time, these interfaces will be able to serve for integration of research and development activity in related fields too (such as marine biology and marine agriculture).

⁸³ Such as the AquaCulTech community for innovation marine agriculture, which was established as a collaboration between the Ministry of Agriculture, the Ministry of Economy, the Innovation Authority and the Israel Innovation Institute.

⁸⁴ Such as the innovation center in Ashdod Port.

⁸⁵ The governmental agency in charge of scientific cooperation is the Ministry of Innovation, Science and Technology.

⁸⁶ The governmental authority that is in charge of industry-oriented cooperation is the Innovation Authorities.

⁸⁷ Examples of organizations: EMBRC (an organization that provides access to marine biology laboratories), EMSO (an organization providing access to research infrastructures in the oceanography field), EuroFleets (an organization providing access to research ships and additional maritime platforms); Marinerg-i (an organization providing access to infrastructures in the offshore energy field), BlueMed (an organization in the marine engineering field), DBCP (an organization in the field of oceanography and metallurgy), IODP (an organization providing access to research infrastructures for offshore scientific drilling), EURO-ARGO (an organization providing access to an array of measuring buoys).

⁸⁸ Organizations differ from each other in a range of parameters: (1) main activity field: sharing of research infrastructures / joint policymaking in the field / promotion of joint studies / sharing of knowledge and information; (2) economic sector and focal topics: offshore energy / marine biology / multidisciplinary fields / other; (3) financing model: governmental / independent / combined funding.

are intended first and foremost for academic scientific research.⁸⁹ The main activity field of most organizations is sharing of research infrastructures. Membership in these organizations provides: (1) access to offshore infrastructures in research institutes around the world; (2) access to databases; (3) access to research grants; (4) access to international conferences, professional training courses and more.⁹⁰

1.2. Use of existing bilateral agreements for BlueTech studies

An additional channel for scientific cooperation in BlueTech is the use of existing scientific bilateral agreements for BlueTech studies. As of today, Israel has signed 32 scientific cooperation agreements with countries in Europe, Asia and America. These agreements: (1) focus on financing of joint studies conducted by researchers from both countries; (2) enable the holding of joint workshops, joint committees and exchange visits of delegations and binational conferences. Periodically, representatives of both countries meet in order to establish focal topics for joint studies for the next period. At this time, the subject of offshore research and development may be defined as a focal topic in the agreement between the countries.

Out of the 32 existing agreements, there are at least 8 agreements with potential for expansion of cooperation into the BlueTech field: Portugal, Germany, Sweden, Italy, France, Greece, the United States and the United Kingdom. The existing agreements have been examined based on a number of parameters, which include: (1) agreements within which joint studies in the marine science field have been published in the past;⁹¹ (2) agreements with countries that have access to the sea and a significant coastline;⁹² (3) agreements with countries that have influence in the offshore research and development field.⁹³

2. Promotion of industry-oriented cooperation

The last channel for international cooperation focuses on the industry – cooperation efforts between the Israeli industry and foreign industries. Within this, the Innovation Authority employs three main tools: (1) signing of agreements with parallel innovation authorities (sharing of knowledge, delegation exchanges and providing access to financing tools); (2) supporting Israeli companies in getting professional and financial assistance from foreign companies for performing a pilot (commissioning and demonstration) outside Israel's territory; (3) joining industry-oriented international companies (such as Eureka, a network of organizations that provides legal and logistic infrastructures for international cooperation in the innovation industry).⁹⁴

⁸⁹ In practice, some of the services provided within the organizations are also made accessible to the industry and academia.

⁹⁰ A breakdown of infrastructure organizations appears in Goal 1, under the direction of action "examination of enrollment into international organizations providing access to foreign infrastructures"

⁹¹ Germany, Sweden and Portugal. For example, within the bilateral agreement with Portugal, a call has been published on subjects related to BlueTech, such as marine pollution and oceanography. To date, a number of studies have been funded within the call, totaling hundreds of thousands of euros.

⁹² Measured by coastline length (in kilometers)

⁹³ Measured based on three criteria: (1) high concentration of startup companies and patents in offshore research and development (Blue Technology Barometer); (2) high concentration of offshore infrastructures in the country (Eurocean); (3) countries perceived as leaders in the field (according to interviews with academic and industrial parties)

⁹⁴ Another organization, which Israel is not a member of, is BTCA – BlueTech Cluster Alliance: an international organization that promotes cooperation between clusters in the BlueTech field around the world (United Kingdom, Portugal, Norway, Ireland, Canada, Spain, France and the United States). The BTCA's activity fields are: (1) sharing of knowledge and information between industries; (2) promotion of joint offshore research and development initiatives; (3) mutual business development and sharing of financing channels; (4) holding of international conferences and content events.

21. Promotion of international BlueTech cooperation

In relation to each channel for promoting international cooperation (set forth above), the National Plan defines a party responsible for performing the following actions: (1) prioritization of the organizations and countries with which Israel will wish to promote cooperation, while considering the value offered by the action and its feasibility;⁹⁵ (2) defining the resources required for the cooperation effort in question; (3) promotion of the actual cooperation effort.⁹⁶ Promotion of scientific cooperation efforts will be at the responsibility of the Ministry of Innovation, Science and Technology, in conjunction with the relevant professional ministries (of Agriculture, Energy, Environmental Protection and others), and promotion of cooperation in the industry will be under the responsibility of the Innovation Authority along with the relevant Government ministries.

⁹⁵ This involves consultation with experts in the field and considers the contribution to basic research / applied research / development in the industry. In addition, as another factor to be considered for joining organizations, it is important to make sure that membership in the organization provides meaningful options that are not open to participants from nonmember states.

⁹⁶ For example, when joining international organizations, active participation is necessary in order to get the benefit from membership in the organization.

The Transition From Planning to Implementation

The National BlueTech Plan summarizes a broad action that has been conducted with the involvement of a range of governmental, academic, local government and industrial entities.

The plan that has been formed includes two goals and 21 directions of action for achieving them. Some of the directions of action constitute basic moves, the main ones being leading detailed planning moves that will allow for additional directions of action to be realized. This means that they should be promoted at the highest priority.⁹⁷

The Basic Directions of Action Are:

Goal	Component		Directions of action
1. Development of and providing access to enabling infrastructures	Research infrastructures and regulatory infrastructures	Providing access to existing infrastructures	1. Mapping of all existing research infrastructures
		Development of new infrastructures (general)	2. Formation, regulation and simplification of processes of using the existing research infrastructures
			3. Defining a central entity for identifying missing infrastructures and recommending infrastructures for development
		Development of new infrastructures (in polygons)	7. Completion of the process of defining and approving polygons for offshore tests
	8. Formation of an efficient process for approving and conducting offshore tests		
9. Detailed planning for establishing and operating infrastructures in polygons ⁹⁸			
10. Allocation of operational areas in ports as an onshore rear area for offshore tests			
	Additional infrastructures: education and exposure	17. Expansion of exposure to the sea and marine innovation	
2. Formation of an organizational framework for promoting the field in Israel	A dedicated governmental entity for promoting the field		18. Appointment of a governmental entity for leading the BlueTech field

To implement the plan's directions of action and meet the objectives prescribed within it, the governmental entity that will be appointed to lead the BlueTech field will be required to translate the National Plan into detailed, budgeted action plans, which include definition of the governmental entity responsible for each direction of action and the schedules for forming the operative action plans, which will include inter alia success metrics and milestones for performance.

⁹⁷ As part of the directions of action, we have defined only their planning component as a high priority subject, because it constitutes a foundation for budgeting and embarking on implementing the entire direction of action

⁹⁸

The Government agency leading the BlueTech field will concentrate and integrate the implementation of the National Plan and will conduct a semiannual review of the progress of the National Plan, in cooperation with the relevant Government ministries.

In addition, given the rapid development of the field, the governmental agency will lead with all the parties that participated in preparing the National Plan an annual move that will include examination of the plan's accomplishment of its objectives, specific examination of the directions of action defined in the plan and updating the plan as necessary.

Sectorial Development

For forming the National BlueTech Plan, 13 work teams were established, which acted to form the various chapters of the plan.⁹⁹ Out of these, 5 work teams focused on the economic sectors relating to offshore innovation: energy, transport, agriculture, environmental protection and security (each sectorial team was led by the relevant Government ministry: energy team – the Ministry of Energy, agriculture team – the Ministry of Agriculture). Working for three months,¹⁰⁰ the sectorial teams reviewed the current situation in their field (for example – the current situation of marine agriculture in Israel), the potential lying in promoting the sector (economic / environmental / social / other), the barriers to realizing the potential and possible directions of action.

The following pages present the results of the sectorial teams' work. Within the implementation of the National Plan, the relevant Government ministries will take the possible courses of action and derive them into concrete tasks, each with a responsible party, schedule for implementation, budgetary requirements and success metrics.

Agriculture

The meeting point between agriculture and BlueTech is marine agriculture. In the current document, the use of the term “marine agriculture” refers both to onshore marine agriculture (such as growing pools) and offshore marine agriculture (such as fish facilities floating on the sea surface or submerged).

Current situation: agriculture and BlueTech in Israel

Today, Israel has extensive marine agriculture activity, conducted by the Government, industry and academic. In the Government, the agency promoting marine agriculture is the Ministry of Agriculture. The ministry performs the activity in the field through four channels¹⁰¹ (1) support for research and development in the marine agriculture field; (2) formation of policy steps for promoting the field, such as Government Resolution 1442 for development of Eilat-Eilat as an international hub for marine agriculture;¹⁰² (3) promoting international cooperation in the field of: financing joint studies with the United States (within the BARD fund),¹⁰³ cooperation with countries in the region and more; (4) initiation and promotion of a range of projects and plans (at the responsibility of the Department of Fisheries and Aquaculture).

Israel's BlueTech industry has a number of companies operating in the marine agriculture field. These companies focus on developments, innovation and technology (and less on production). A major proportion of marine agriculture companies participate in the AquaCulTech innovation community¹⁰⁴ for marine agriculture, whose

⁹⁹ The process of forming the plan is detailed at length in the introduction

¹⁰⁰ The work of the teams included studying existing documents, analysis of internal data (such as: the volume of applications for supporting offshore R&D) and consultations with professionals in the industry, academia and Government. The teams operated under the guidance of a steering committee headed by the Ministry of Innovation, Science and Technology and the National Economic Council. The results of the teams' work were presented to the broad thinking forum and were updated according to their comments.

¹⁰¹ The units leading the field in the Ministry of Agriculture are the Ministry of Agriculture's Chief Scientist and the Department of Fisheries and Aquaculture; the department deals both in promoting marine agriculture (in general) and promoting innovation in marine agriculture (specifically)

¹⁰² Government Resolution 1442 was intended to achieve three goals: (1) consolidation of Eilat and Eilat Region's status as a national and international research and practical center in the fields of sea and desert food, marine biotechnology and water and desert agriculture; (2) promotion of planning and development of a marine agriculture and food industry and sea products park; (3) assistance in economic growth and diversification of employment source in the Eilat and Eilat Region area.

¹⁰³ BARD – the binational U.S.-Israel agricultural research and development fund

¹⁰⁴ Which was established as part of cooperation between the Ministry of Agriculture, the Ministry of Economy, the Innovation Authority and the Israel Innovation Institute.

purpose is to encourage development, examination and demonstration of innovative solutions in marine agriculture and related fields.

In the academia, there are a number of institutes that conduct research related to marine agriculture:¹⁰⁵ the University of Haifa, the Hebrew University, Ben Gurion University, Rupin College, Volcani Institute, MIGAL Galilee Research Institute and the National Marine Agriculture Center.¹⁰⁶ The research fields are diverse and include aspects of marine chemistry and biology, geophysics, physical oceanography, flow and mixing processes, models for predicting the sea state, ecology, immunology, effects of human activity on the sea and coast, seabed research, global warming, domestication of new species, reproduction processes, raising, feeding, morbidity, genetics, water quality, systems engineering and design, alga growing, producing and extracting materials and more.

The potential lying in promoting the sector

In Government Resolution 1442 it was decided to develop the city of Eilat and the Eilat region as an international marine agriculture hub. The potential lying in promoting marine agriculture in Eilat¹⁰⁷ consists of two aspects: (1) increasing seafood production capacity to promote national food security; (2) boosting economic growth in the region while diversifying employment sources and attracting residents to the region. As a national comparison, Eilat is at a favorable opening point for promoting marine agriculture, for two main reasons: (1) sea and environment characteristics – 1A) a calm sea that is convenient for performing marine research; 1B) an offshore environment that adjoins a desert environment; 1C) a tropic marine environment that permits research and fishing that are not feasible in the Mediterranean environment; (2) infrastructure characteristics – 2A) the Inter-University Marine Science Institute, which has dozens of researchers and advanced degree students, is based in Eilat; 2B) Eilat hosts the National Marine Agriculture Center, which promotes this field.

Barriers to promoting the sector

There are a number of barriers to realizing the potential lying in the sector: (1) a shortage of quays – marine agriculture requires a quay to serve as a “mother base” for embarking on activity: unloading and loading of equipment, packing, logistics and more. Currently there is a shortage of marine agriculture quays in Israel, along with a more general shortage of docking stations; (2) limited areas for marine agriculture activity – the few onshore areas that are designated for marine agriculture activity¹⁰⁸ are waiting for a municipal construction plan.¹⁰⁹ Additional territories¹¹⁰ have not yet been allocated, owing to cost issues or environmental aspects; (3) expensive land – the price of leasing marine agriculture land is identical to the rate for onshore agriculture land; (and is no cheaper, contrasting with the practice in leading countries in the field); (4) environmental limitations – currently, growing farms in the Red Sea are banned, owing to environmental concerns; (5) additional limitations – a small number of growers, problematic insurance conditions, financing difficulties for entrepreneurs and more.

¹⁰⁵ Despite the large amount of research conducted in the field, there are few study tracks specific to it.

¹⁰⁶ Operating under Israel Oceanographic & Limnological Research and located in Eilat.

¹⁰⁷ Both marine agriculture in general and innovation in marine agriculture in particular.

¹⁰⁸ Most of them are in Ashkelon and Ashdod.

¹⁰⁹ There are areas that are ready for tendering, but a delay in assistance for the development of infrastructures (such as for seawater transmission) impedes progress.

¹¹⁰ Most of them are in the countries north (for example Michmoret).

Possible directions of action for promoting the sector

To promote the field, it is necessary to examine six possible directions of action: (1) forming a national strategic plan for marine agriculture;¹¹¹ (2) increasing production of seafood; (3) establishing a marine agriculture ecosystem – creating and tightening relations among entities in the region, attracting new parties (farmers, entrepreneurs, companies and commerce); (4) planning of onshore areas for marine agriculture; (5) building of specialized quays; (6) examining the construction of a marine laboratory in Michmoret, combined with an offshore research and development area.

Energy

Offshore research and development in energy fields focuses on the use of the offshore space for producing energy: offshore solar energy production, offshore wind energy production, wave energy production, offshore biomass production (for energy purposes) and more.

Current situation: energy and BlueTech in Israel

In the Government, the agency that promotes offshore innovation in the energy field is the Ministry of Energy. The ministry operates in the offshore space in three fields: (1) natural resources: natural gas exploration and production (licenses, drilling, platforms, supervision), sand resource management, desalination; (2) energy infrastructures:¹¹² planning and licensing of gas and fuel pipelines, electricity cables, desalination facilities; (3) renewable energies: examination of production, examination of the regulation required for renewable energy facilities, performing environmental surveys, promotion of research and development and more.

Directly, the Ministry of Energy supports offshore research and development activity through funding of approximately NIS 5 million per year.¹¹³ Indirectly, the Ministry promotes offshore research and development through Israel Oceanographic & Limnological Research – the Ministry's executive arm in the offshore monitoring field.

In the industry, less than ten companies deal with the interface between energy and BlueTech. These companies focus primarily on wave energy production.

The potential lying in promoting the sector

The offshore space reflects a possible solution for Israel's national challenges in the energy field. Through research and development in the offshore space, it is possible to: (1) produce renewable energies (solar energy,¹¹⁴ wind energy, hydrogen production, biomass growing and more); (2) achieve long-term energy storage; (3) import and export energy (on land, Israel is an “energy island”); (4) promoting efforts in related fields, such as reducing carbon emissions (for example by marine carbon fixation).

¹¹¹ For integrating and implementing Resolution 1442, a special purpose directorate was established at the Ministry of Agriculture. Currently, the planning processes in the directorate are underway and in the coming months a multiannual plan for promoting marine agriculture in Eilat will be published. Formation of a national strategic plan for marine agriculture in Israel will help extend the outreach to additional activity hubs.

¹¹² Existing infrastructures are divided into three types: (1) gas – treatment facilities, platforms, pipes, gate valves, regasification vessel and more; (2) electricity and fuels – coal piers, offshore moorings, LPG pipes and more; (3) water – desalination facilities, brine inlet and outlet pipes.

¹¹³ According to Ministry of Energy estimates

¹¹⁴ Production of solar energy requires a large area; according to the Ministry of Energy, there is a shortage of onshore area for installing solar panels.

Compared to other countries, Israel is at a favorable opening point to promote offshore energy research and development, for three main reasons: (1) favorable sea conditions (a “comfortable” sea); (2) a well-developed high tech industry (in related fields); (3) high awareness of the need to transition to renewable energies.

Barriers to promoting the sector

There are four barriers to realizing the potential lying in the sector: (1) missing knowledge infrastructure – a lack of available, reliable information on the environmental and physical conditions in Israel’s offshore space, which are expected to affect activity in the offshore energy field (and to be affected by this activity); (2) a lack of areas for installing offshore test installations;¹¹⁵ (3) a lack of support circles for promoting the field (investments, international research and development, information for the public); (4) a need to connect marine energy infrastructures to land.

Possible directions of action for promoting the sector

To promote offshore research and development in energy fields, three possible directions of action should be examined: (1) expansion of the knowledge infrastructure relative to the marine environment – conducting a strategic environmental survey of renewable energies in Israel’s offshore space, measurements of offshore winds (short-term and long-term), building a meteorological radar and more; (2) installation of offshore test facilities – for example, offshore energy capturing points; (3) expansion of governmental investment in the field – for example, increasing the Ministry of Energy’s direct support for offshore research and development activity. This will focus on fields that have potential for implementation in Israel, such as producing renewable energies, storage facilities, energy efficiency improvement and marine carbon fixation.

Environmental Protection

Offshore research and development in environmental protection fields includes a wide range of fields, including: identification of sea pollution, treatment of sea pollution, treating effluents, degradation of plastic, coping with coastal erosion, biological rehabilitation, development of marine environment friendly materials and more.

Current situation: environmental protection and BlueTech in Israel

The Ministry of Environmental Protection is acting in three channels to promote research and development in the offshore space: (1) publishing calls for studies on the subject of sea pollution and protecting the marine environment (locating plastic sources, dealing with leak incidents and more); (2) answers to requests to conduct offshore tests and lay offshore installations; (3) monitoring of the Mediterranean Sea – budgeting of activity within Government Resolution 4399 for monitoring the Mediterranean Sea, leading the committee for reviewing the plan. Alongside encouraging research and development, the Ministry of Environmental Protection also acts in the offshore space in the marine environment protection field (through the National Marine Environment Protection Division).¹¹⁶

It is estimated that there are dozens of companies in the environmental protection field that have direct or indirect bearing on the offshore space.

¹¹⁵ As set forth in goal 1, the direction of action “completion of the process of defining and approving polygons for offshore tests”

¹¹⁶ The unit has 36 workers, who operate 7 monitoring ships, a work ship and offroad vehicles. The unit is in charge of protecting the marine and coastal environment from onshore and offshore pollution sources, gas, oil and others.

The potential lying in promoting the sector

Compared to other fields, the potential for promoting technological-offshore developments in the environmental protection fields is of twofold importance – environmental and economic alike. The connection between environmental protection and BlueTech facilitates: (1) coping with marine pollution (for example: high resolution satellite monitoring for locating pollutants, development of microplastic collection technologies, solutions for biodegradation of plastic); (2) treatment of urban effluents and surface runoffs;¹¹⁷ (3) developing green offshore construction solutions;¹¹⁸ (4) removing carbon from the atmosphere (for example: undersea storage of carbon, biofixation). These developments are of great importance to the environment and have commercial potential for the industry.

Compared to other countries, Israel is at a good opening point for developing technological-offshore solutions for environmental protection: (1) a global lead in the desalination field and in water recycling techniques; (2) proven ability in related technological fields: remote sensing technologies, prediction tools, artificial intelligence; (3) unique conditions for examining solutions for coping with invasive species (Israel is “leading” in the number of invasive marine species, thus serving as a “laboratory” for examining developments in the field); (4) experience in making environmental adjustments in the field of offshore gas energy production.

Possible directions of action for promoting the sector

To promote offshore research and development in environmental protection fields, it is necessary to examine a number of possible directions of action: (1) forming a five-year strategic plan for leveraging the blue tech field in environmental protection, corresponding with the Ministry of Environmental Protection’s objectives; (2) expansion of the support for academic research and development – defining priority fields for research in the marine environmental protection field, expansion of the level of support for studies; (3) expansion of support for industrial research and development – support for pilots in the marine environmental protection field; (4) enhancement of regulation referring to conducting offshore tests – defining the requirements and processes for approving offshore tests so as to ensure a balance between promoting research and development and protecting the marine environment; (5) forming international cooperation efforts – promotion of cooperation with parallel ministries in the world dealing with marine environmental protection.

¹¹⁷ Building of green basins/installations for purifying surface runoffs before their discharge into the sea

¹¹⁸ For example: fabrication of offshore structures (detachable or permanent) such as Eco-Concrete, including breakwaters, undersea infrastructures, pipes, bathing beach structures and additional structures.

Transport

Offshore research and development in transport fields includes a wide range of subjects from different disciplines, from building of artificial islands, development of unmanned watercraft to promotion of port technologies.

Current situation: transport and BlueTech in Israel

Because Israel is an island economy, the activity performed to date for promoting transport research and development has focused on the world of ports (foreign trade completely depends on seaports – 99% of imports and exports pass through seaports).¹¹⁹ Efforts in this field are headed by Ashdod Port's innovation apparatus, which supports the development and formation of startup companies in port fields and provides them testing infrastructures for transitioning from concept to product. To date, the apparatus has hosted more than 60 companies in various port fields (for example – supply chain).

The potential lying in promoting the sector

The offshore space reflects a possible solution for Israel's national challenges in the fields of transport and additional fields. Through research and development in the offshore space, it is possible to: (1) promote the construction of offshore islands off Israel's shores; artificial islands will help in coping with dwindling land reserves, moving critical infrastructures out to sea and freeing up the shoreline for use as bathing beaches, for tourism and for municipal uses; (2) developing autonomous watercraft, which will help save transport costs for most goods imported into Israel; (3) coping with additional national challenges (for example, improving the efficiency of the lengthy queues at ports).

Barriers to promoting the sector

The barriers to promoting offshore research and development in transport fields are field-dependent. For example, in the artificial islands field, the barriers are budgetary and environmental. In the autonomous watercraft field, in contrast, the barriers are regulatory: (1) the current regulation does not permit operating autonomous watercraft in Israel's waters; (2) no "sea corridor" is defined for performing tests involving autonomous watercraft.

Possible directions of action for promoting the sector

A transport team in the national BlueTech program has pointed at six research and development fields that must be focused on: (1) development of autonomous watercraft – merchant fleet, tugboats and pilot boats; (2) construction of artificial islands; (3) improving the efficiency of the container removal process; (4) improving the efficiency of queues at ports (for example, unloading in the open sea); (5) use of environmentally friendly raw materials (for example, marine structures combining marine habitats); (6) additional fields: marine measurement from the air, simplification of test drilling, development of advanced construction materials for the marine environment.

In the fields that will be chosen, it is necessary to appoint a governmental project leader to promote the field (for example, appointing a project leader in the Shipping and Ports Authority to promote the subject of autonomous watercraft), expand the level of investments in research and development (for example, publishing a specific call for "green" offshore construction) and promoting broad policies (for example, defining a "sea corridor" for autonomous watercraft trials).

119 In weight terms. Source: Israel Ports Company. Trade is performed through six ports – four private ports (South Port, Haifa Bay Port, Eilat Port, Israel Shipyards) and two governmental ports (Haifa Port, Ashdod Port).

Security

Current situation: security and BlueTech in Israel

In the security sector, most offshore research and development activity is performed by the Ministry of Defense and the Israel Navy. This activity includes: (1) promoting security studies in cooperation with the academia and industry; (2) promotion of dual research and development; (3) regular budgeting of infrastructures and researcher groups; (4) procurement of advanced platforms and systems; (5) conducting operational trials; (6) promotion of defense cooperation with other countries;¹²⁰ (7) promotion of cooperation between the defense establishment and the academia and industry – making research and development infrastructures accessible, establishing education programs, joint activity with venture capital funds and more. In addition, there is widespread offshore activity in the defense industry (Rafael, Elbit and Israel Aerospace Industries), which promotes research and development in the offshore and underwater space, in Israel and overseas. Finally, there are a number of other companies active in the industry developing innovative solutions for specific needs.

The potential lying in promoting the sector

Naturally, the potential lying in the promotion of the sector is first and foremost defense-related. Promoting offshore research and development in defense fields allows for developing defense securities in offshore contexts and maintaining Israel's offshore defense superiority. However, the importance of the field in security terms also provides significant economic potential – defense systems may be sold outside of Israel, or defense capabilities can be repurposed for civilian uses that have significant commercial protection.

Possible directions of action for promoting the sector

To promote marine research and development in the security field, three directions of action must be examined: (1) expansion of development of marine infrastructures; (2) promotion of local cooperation between the defense establishment and the academia, the defense industry, the civil industry, Government ministries and local authorities¹²¹; (3) promotion of international cooperation.

¹²⁰ This cooperation helps , inter alia, in promotion of the knowledge and capabilities of dozens of Israeli defense and civil companies.

¹²¹ In the last two years, for example, the Ministry of Defense has been cooperating with the Municipality of Haifa in the dual research and development field.

Appendix

Members of the Thinking Forum for Promoting BlueTech in Israel

Entity	Name
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Environmental Protection Conurbation	Eitay Miraz
Western Galilee Cluster	Li-At Cohen
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	Niv Cohen
The Planning and Budgeting Committee	Naomi Beck
	Gabi Appel
	Varda Ben Shaul
The National Economic Council	Yuval Admon
Coastal Marine Engineering Research Institute (CAMERI)	Rotem Cohen
	Gabi Gordon
	Rami Zeiger
Israel Oceanographic & Limnological Research	Alon Zask
	Raz Tamir
	Jacob Silverman
	Tamar Guy Haim
The Blue Innovation and Economy Center	Hila Ehrenreich
Israel Ports Company	Noa Oren
	Daniella Ostrovsky
Israel Navy	Alex Kleiman
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Advisor (to the Planning Administration)	Danny Amir
Advisor (to the Municipality of Ashdod)	Shalom Daskal
Advisor (to the Municipality of Ashdod)	Tzila Karniel
The Planning Administration	Ronit Mazar
	Anat Arieli
The Israel Export Institute	Nili Shalev
MAFAT (Directorate of Defense, Research & Development)	Alon Erlichman
	David Shaul Attias
Ashdod Marine Education Center	Aviad Scheinin
	Dror Vardimon
MERCI	Dan Chernov
Ministry of Finance	Talya Yoshpe
Ministry of Energy	Gideon Friedman
	Sarit Brand Klibanski
	Olga Zlatkin

Entity	Name
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Ministry of Innovation, Science and Technology	Hila Haddad Chmelnik
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Ministry of Foreign Affairs	Roy Dvir
Ministry of Agriculture	Michal Levi
	Noam Moses
	Irena Ettinger – Weinstein
	Yuval Peleg
	Amit Soya
Ministry of Economy	Oz Katz
	Noa Spitzer Mizrahi
Ministry of Justice	Josef Gedalyahu
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Ministry of Transport	Ofer Elisar
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Prime Minister's Office	David Yamin
	Ibrahim Zoabi
Israel Space Agency	Adi Ninio
Municipality of Eilat	Udi Gat
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	Assaf Admon
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Entity	Name
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	Eli Nacht
	Dina Bar Ulpan
	Yamit Honikman
	Shlomit Shohat
Municipality of Haifa	Nachshon Tzuk
	Anna Levin
The Innovation Authority	Tzachi Shnarch
	Sagi Dagan
	Neta Gruber
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The Water Authority	Uri Shabbat
Shipping and Ports Authority	Zvika Shapira
Israel Land Authority	Elad David Pivko
HiCenter	Lior Hanuka
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