SCENARIOS FOR MARITIME AREAS 2050

Preparation of scenarios for the future of Finnish maritime areas

EUROPEAN UNION
European Maritime and Fisheries Fund

MARITIME SPATIAL PLANNING

capful

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Introduction

How to read the scenarios

Scenarios for the future of the maritime area and their impact assesment were created for maritime spatial planning. The scenarios discuss the changes in the operating environment of the maritime area as well as the needs and views of interest groups regarding the future development of the Finnish maritime area. The assessment concerns, in particular, energy, maritime transport, environment, fishing and aquaculture, cultural heritage, tourism and recreational use, defence, marine industries, biotechnology and mineral extraction industries.

The scenarios presented here are descriptions of the possible and alternative futures of the operating environment in Finnish maritime areas until 2050. They are not an attempt to predict the future; instead, they are intended for the development of thinking and perspectives. The scenarios guide towards varied and consistent thinking over some alternative future options and thereby enhance the conditions for interpreting and understanding current phenomena and enhancing the planning of operations and the ability to respond.

The scenarios described here may seem more or less likely for different people. **The purpose is not, however, to select one scenario above others by placing the scenarios in an order of likelihood or preference.** Instead, the overall picture formed by the scenarios should be viewed. The events taking place in the future are often a combination of different scenarios.

In this document, **the descriptions of maritime areas presented in the scenarios as well as the risks and opportunities are a compilation of materials of the workshops organised in spring 2019.** The work has been commissioned by the Ministry of the Environment.

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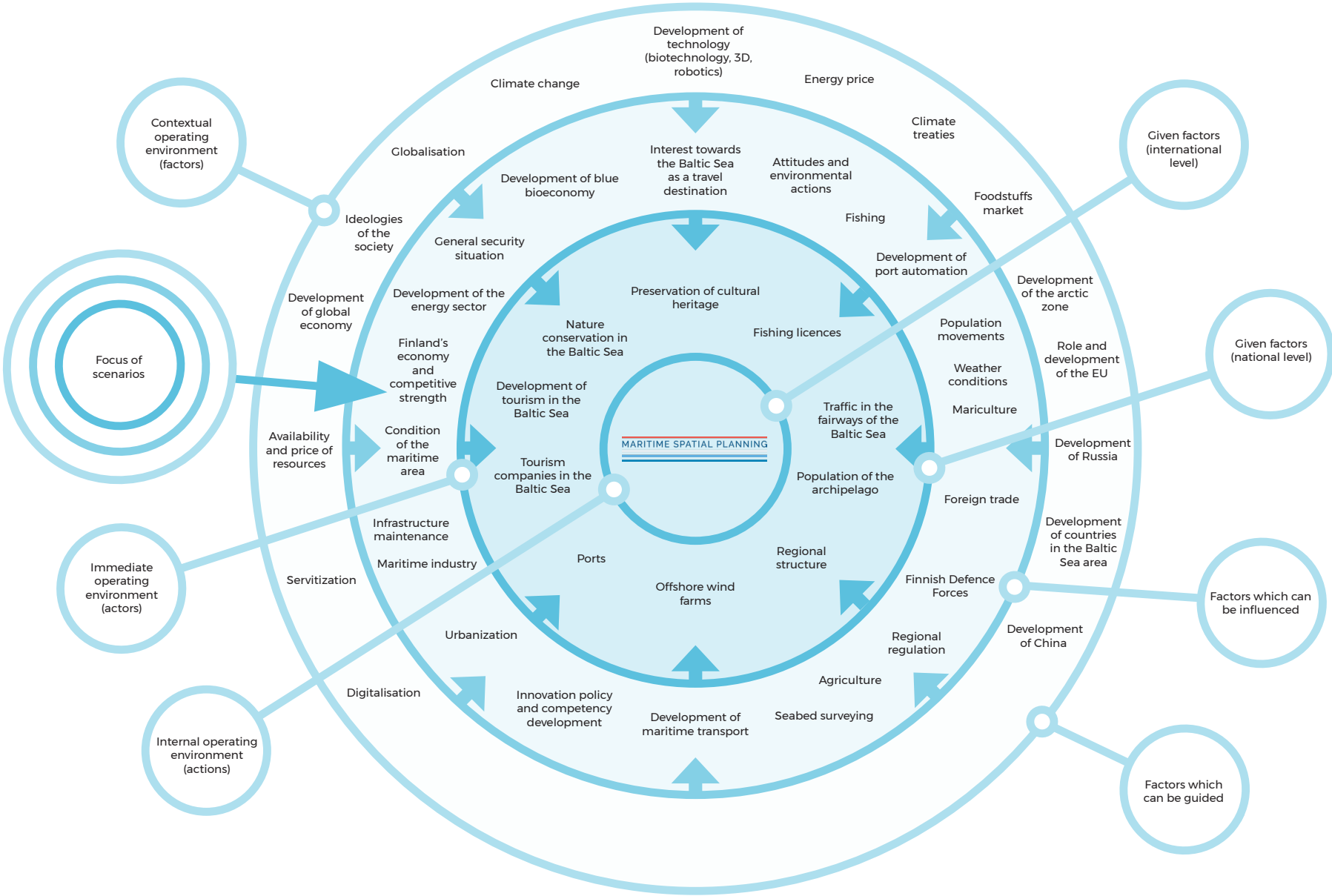
Change agents of the operating enviroment

Focus of the maritime scenarios



Scenarios for maritime areas 2050

Three alternative images of the future at the Baltic Sea

Scenario 1

Dancing with big businesses

Baltic Sea as a source of energy and minerals

- The EU has been moving towards a more liberal market and deregulation is ongoing. **The interests of companies and cities are steering the development more than the state.**
- In addition to food production, maritime areas are being utilised especially **as raw material for high added value products** for the needs of companies.
- Environmental politics are ineffective and we are not getting rid of fossil fuels as we wanted. **Offshore wind power** is built by large global corporations as very extensive farms with little regulation.
- Autonomous vessels are becoming more common in the Baltic Sea. **The Helsinki–Tallinn tunnel is constructed** with the support of Chinese investments, which has an impact on passenger traffic in particular. Maritime logistics are increasing, also in the Arctic Sea (the Northern Sea Route).
- Population concentrates in the biggest cities around the Baltic Sea. **Climate refugees** increase the passenger flows of the Baltic Sea.
- The Baltic Sea has regressed to a difficult patient as **eutrophication and oxygen loss aggravate in all maritime areas**. The living conditions of key species and communities are under threat.
- **Aquaculture** increases as it becomes more profitable and production focuses on larger and larger units.
- Tourist interest is focused on the large cities and cultural heritage of the Baltic Sea. **The poor condition of the maritime environment reduces nature and cultural tourism** in the archipelago.

Scenario 2

Profitability under the enviroment's terms

Baltic Sea as an oasis of recreation and experiences

- Concern over the environment is increasing and **climate issues become a central focus of politics**. Consumers are more environmentally aware and their choices also guide companies towards providing sustainable solutions.
- The search for renewable forms of energy is strong and **the state supports the connection of offshore wind power to the grid**. Production is profitable also further from the shore.
- The electrification of traffic also reaches to waters.
- **Small volume transport becomes more and more common**, which moves the load from the sea to the air and also improves the accessibility and services of the archipelago. **Local traffic and logistics are emphasised**.
- People seek clean nature in increasing volumes. **New housing trends and the transformation of work life increase the popularity of the archipelago** also for living.
- The harmful impact of climate change on the weather at the Baltic Sea turns out to be less severe than expected.
- **Natural fish populations gain strength** and professional and leisure fishing increase within the boundaries allowed by the environment.
- **Strict environmental regulation restricts the increase of large-scale aquaculture on the sea** and fish farming in closed water systems becomes more common, especially on the ground.
- The calm and clean environment and the improved service offering attract **new tourists to the Baltic Sea from nearby countries**. The majority of tourism concerns the Archipelago Sea and nature sites.

Scenario 3

Baltic Sea of restrictions and tensions

Baltic Sea as a breadbasket and strategic playing field

- The power struggle between global superpowers has escalated into a trade war and **tensions between the West and Russia are increasing in the Baltic Sea**. The uncertain security situation reduces investments.
- Cooperation between EU countries increases and **the union tightens its control especially with respect to environmental and energy politics.**
- Energy self-sufficiency on the European level is emphasised and a **joint energy union** of the EU is created. Renewable energy, such as offshore wind power, is subsidised and farms are constructed alongside transfer cables.
- The strategic importance of logistics routes is emphasised and **the ports of the west coast become stronger.** Passenger traffic reduces substantially especially in the south.
- Internal mobility within EU increases and Finland's biggest coastal cities keep their vitality. **The infrastructure of the archipelago gets weaker.**
- Signs of climate change can be observed in the weather conditions, but the Baltic Sea is still a favourable environment for many sources of livelihood.
- **Environmental cooperation with Russia is challenging**, which has a negative impact on the state of the maritime environment.
- **Efforts to reach self-sufficiency in the production of protein increase aquaculture** and production becomes multifold, focusing on the Bay of Bothnia and the Archipelago Sea in particular.
- Tourism has become more difficult and **local recreation is emphasised**. Tourism potential is aimed towards the Bay of Bothnia.

Scenario

1

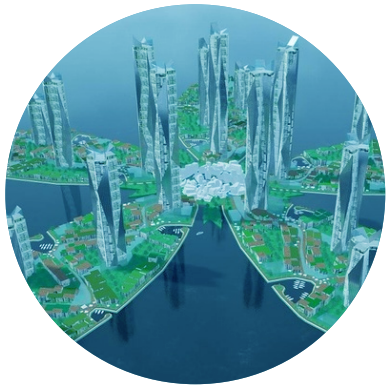
Dancing with big businesses

MARITIME AREA FUTURE TABLE

DEVELOPMENT OF MARITIME LOGISTICS	SECURITY SITUATION	TOURISM AND RECREATIONAL USE	INTERNATIONAL TRADE	ENERGY SECTOR	ATTITUDES AND ENVIRONMENTAL ACTIONS	CONDITION OF THE MARITIME AREA	CLIMATE CHANGE IN THE BALTIC SEA	FISHING AND AQUACULTURE	URBANIZATION
Uncertain and centralised maritime logistics (strategic importance of fairways is emphasised)	**Baltic Sea of peace** (focal point of security politics is elsewhere)	**New tourists find the Baltic Sea archipelago** (increased popularity of nature tourism)	**Stronger cooperation within the EU** (EU sticks together in the midst of global protectionism)	**Energy unionformed byinfrastructure projects** (moderate increase of offshore wind power in restricted areas)	**Greener through regulation** (strong role of the EU and the state in protection)	**Baltic Sea weakens** (eutrophication and oxygen loss aggravate)	**Moderate change** (climate change has no significant effect on the weather)	**Sea as a breadbasket** (fish as environmentally friendly mass production, fish as replacement of meat)	**Biggest coastal cities keep their vitality** (ageing population moves to nearby cities)
The volume of maritime logistics increases at the companies' terms (logistics networks of the companies)	**Increased tension in the Baltic Sea area** (cooperation more difficult, hybrid influencing)	**Tourism in the Baltic Sea becomes more difficult** (less recreational use of the maritime area)	**International trade** (global markets in the Baltic Sea)	**End of combustion and electrification** (subsidised grid connection of offshore wind power, farms further out on the sea)	**Profitable and green** (new business under the terms of responsibility)	**The status stays poor** (blue-green algae blooms and nutrient load)	**Significant changes** (effects of climate change reflected on the Baltic Sea)	**Changing fish population and steady increase of aquaculture** (large units optimal, with profitable locations)	**Strong concentration on the metropolis,port cities die down** (big cities expand, immigration)
Reduced environmental effects of maritime logistics (circular economy, local production,small volume transport)	**Congested Baltic Sea** (new security policy situation, climate refugees)	**Tourism concentrates in the biggest cities around the Baltic Sea** (increased cruise tourism, interest in the culture)	**Ecological footprint steers consumption** (local production and consumption, new technological solutions)	**Moderate energy transition** (offshore wind power under the terms of companies, no subsidised grid connections, small farms near the shore)	**Ineffective environmental policy** (large-scale offshore wind power projects cannot be started)	**Improved condition of the maritime area** (successful reduction of load and recovery of the sea)	**Radical change** (heavy rainfall, floods, major seasonal variation)	**Flourishing leisure fishing and strict regulation of aquaculture** (return of Baltic herring as food, fish farming on the ground in closed water systems)	**Increased popularity of the archipelago** (transition of work life, living in many places, people seek access to pure nature)

Developments emphasised in scenario 1

National description



SOCIETY AND POLITICS

Global trade flows become concentrated and the market liberal EU is deregulating. Global large corporations invest in Finland in logistics and submarine data centres, among other things. The interests of companies and cities are steering the development more than the state and finding a shared political will is difficult. In addition to food production, maritime areas are being utilised especially as raw material for high added value products for the needs of companies. The high demand for resources leads to the expansion of the mining industry to the Baltic Sea, especially the Archipelago Sea area (e.g., battery technology, pharmaceuticals industry). Significant new innovations in the exploration of the seabed and the utilisation of nutrients. Increased environmental radicalism driven by individuals and small groups.

ENERGY

Environmental politics are ineffective as development is driven largely by companies and technology, and we are not getting rid of fossil fuels as we wanted. The use of peat also increases the marine nutrient load. The demand for energy increases in the Baltic Sea due to the electrification of the society (e.g., 5G network, traffic, smart cities), and large production facilities are favoured. Offshore wind power is built by large global corporations as very extensive farms with little regulation (on the open sea), which results in conflicts with regard to the use of the maritime areas.

MARITIME TRANSPORT

The development of data communications and autonomous technology rapidly affect logistics. Autonomous vessels are becoming more common in the Baltic Sea and the existing fairways are expanded and deepened. People and goods move fluently in cities and growth corridors, but on the other hand, transport to sparsely populated areas becomes slower and more expensive. The Helsinki–Tallinn tunnel is constructed with the support of Chinese investments, which has an impact on passenger traffic in particular. The volume of maritime logistics and vessel size increase and new solutions are being developed under the companies' terms (incl. separate logistical networks of companies). Traffic in the Arctic Sea also increases steadily as the ice layer melts, and the logistical importance of the Northern Sea Route increases (Chinese interests, Arctic Ocean Railway).

CITIES AND POPULATION

Population concentrates in the biggest cities around the Baltic Sea (incl. St. Petersburg, Stockholm, Helsinki, Tallinn, Turku) and the significance of other shore cities reduces. The communities grow in Helsinki and Turku in particular and storm water flows from cities increase. The lack of joint immigration policy on the EU level leads to an uncontrolled refugee crisis. Climate refugeeship increases the passenger flows over the Baltic Sea and requires a new kind of cooperation and border operations between states. The majority of maritime traffic concerns the Gulf of Finland, around the metropolitan area.

Scenario 1 *Dancing with big businesses*

THE ENVIRONMENT AND CONDITION OF THE MARITIME AREA

The Baltic Sea has regressed to a difficult patient as eutrophication and oxygen loss aggravate in all maritime areas. The increasing vessel traffic and hydraulic engineering reduce biodiversity, and introduced species become more abundant. Nutrients from agricultural emissions leach into the Baltic Sea more and more due to abundant raining and the nutrient load increases. Extreme weather phenomena caused by climate change, such as heavy rainfall and coastal area flooding are becoming more common. The increased rain and runoff water reduce the salt content of the Baltic Sea which hinders the living conditions of key species and communities. The sea level is increasing and affecting coastal areas especially during storms. Ice layer during the winter is also significantly smaller.

FISHING AND AQUACULTURE

Many species of fish are pushed into a corner as the living environments change, and the changes in species impact fishing. Key species such as bladder wrack disappear and the Baltic Sea's ecosystem shakes. Commercial fishing for food reduces significantly due to the water quality and the fishing of forage fish increases. Typical sweetwater fish species become more common and fishing fleet more centralised (trawling further away from the shore). Foreign demand for fish is strong and exports of fish products increase. The increased water temperature hinders aquaculture in the south and the pressure to move towards the north increases. Aquaculture increases as it becomes more profitable and companies focus their production on larger and larger units. Large facilities are located primarily according to excellent cultivation conditions (cf. according to nutrient load).

TOURISM AND RECREATIONAL USE

Tourist interest is focused on the large cities and cultural heritage of the Baltic Sea and tourism focuses near the cities. Cultural heritage sites are bought from the state to private use, which endangers the preservation of cultural heritage (e.g., areas released by the Finnish Defence Force). Quick access is seen as an advantage of the Baltic Sea cities, and the cultural history of the region interests Asian tourists, for example. Due to the increasing effect of climate change, also German tourists are moving from the Mediterranean to the easily reachable Baltic Sea destinations. Cruise travel in the Baltic Sea increases strongly (e.g., large hotel ships). The poor condition of the maritime environment and privatization of areas (e.g., submarine data centres) reduce nature and cultural tourism in the archipelago and create prohibited areas. Activism tourism also increases.

Description of plot

2019-2025

Increased pressure on electrified and urbanized societies

- Competition between countries drives Europe to **reduce the regulation of industries**. Finland also starts deregulation as an atmosphere favouring businesses grows stronger.
- Urbanisation accelerates even more and the Baltic Sea **cities**, such as St. Petersburg, Stockholm and Helsinki, **increase uncontrollably**. Storm water from the cities and littering (incl. microplastics, new chemicals) increase.
- China increases its investments on European infrastructure projects. The construction of **Helsinki–Tallinn railway tunnel** starts with Chinese funding. Building permits have been issued for the planned artificial islands as well.
- The **demand for energy increases** in the Baltic Sea due to the electrification of the society (e.g., 5G network, traffic, smart cities), and large production facilities are favoured. **The data cabling of the Northern Sea Route** from the Barents Sea to Asia is completed.
- Utilisation of marine minerals (tellurium, cobalt, manganese, phosphorus) increases, and so does the pressure to **develop submarine mining activities**. Global large corporations invest in Finland in **submarine data centres** as well.
- The interests of companies and cities are steering the development even more than the state and **finding a shared political will is difficult**. Citizens shy away from the control measures aimed at curbing climate change and the emissions of the society aren't reduced sufficiently.
- **Extreme weather phenomena** caused by climate change, such as heavy rainfall and coastal area flooding gain strength in the Baltic Sea area. Attitudes towards the conservation of the marine environment are **indifferent** and cooperation between countries sporadic.
- With increased deregulation, **large aquaculture facilities** are planned for the northern maritime areas in particular.

2025-2035

Interests of big companies guide the direction and political decision-making becomes more difficult

- Discussion in the society focuses on the promotion of economic growth and EU's **environmental policy turn out to be ineffective** with the development highly focused on companies and technology. The implementation of global climate treaties is in trouble.
- Very **large offshore wind farms** are constructed on the open sea especially by global corporations with little regulation.
- The **tunnel** between Helsinki and Tallinn **opens for passenger and freight transport**, which significantly increases commuting between the cities. The **Rail Baltica connection** between Warsaw and Tallinn is also completed.
- **Ports are merged** and some move to foreign ownership.
- The lack of joint immigration policy on the EU level leads to an **uncontrolled refugee crisis**, which also increases the passenger flows crossing the Baltic Sea by sea.
- German tourists are also moving from the hot Mediterranean to the easily reachable Baltic Sea destinations and **cruise travel in the Baltic Sea increases** strongly.
- The increasing demand for maritime minerals leads to the **expansion of the mining industry to the Baltic Sea**, especially the Archipelago Sea area (e.g., battery technology, pharmaceuticals industry).
- **Load of the Baltic Sea increases** substantially due to the increasing vessel traffic and hydraulic engineering, which is reflected in introduced species become more abundant, among other things. The increased rain and runoff water **reduce the salt content of the Baltic Sea** and the nutrient load increases.
- The poor water quality and strong storms **slow down the development of aquaculture** and the warming of the sea moves the focal area of fish farming further to the north. Commercial **fishing for food** reduces significantly and the fishing of forage fish increases even further.

2035-2050

Raw materials and emission-free energy are sourced from the sea under market terms

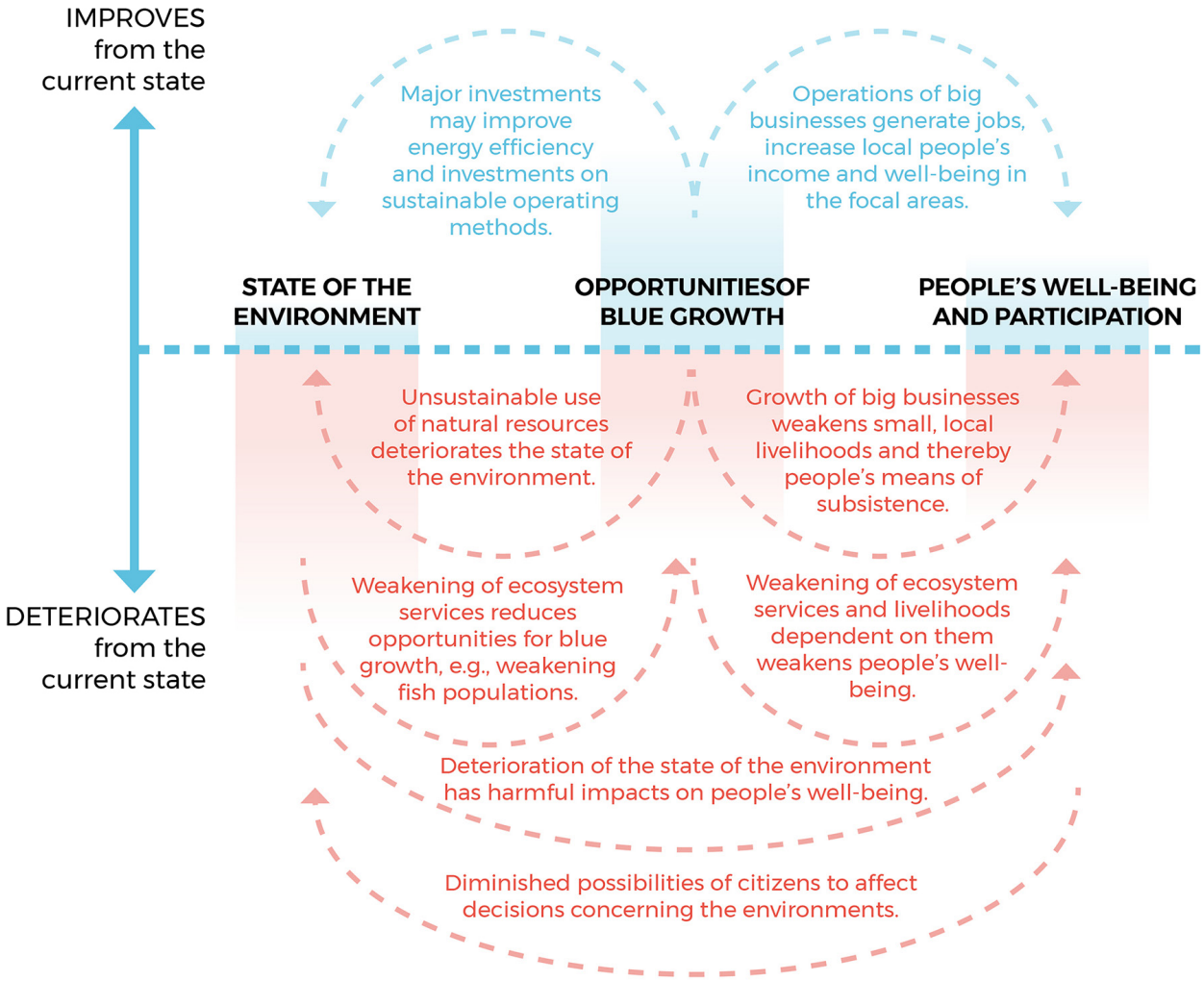
- As people become frustrated with the weak regulation, **environmental radicalism** driven by individuals and small groups grows stronger. **Large companies and cities** take on a more powerful role in the meeting of climate targets.
- **The polluted and congested Baltic Sea** is utilised largely as a source of emission-free energy and industrial raw materials for the digitalised societies.
- **The minimisation of climate emissions trumps the preservation of maritime nature's diversity** and conservation areas are reduced.
- Big companies develop more and more **private energy production solutions and logistics networks**. Autonomous freight transport also increases in the Baltic Sea and new remote control centres are established.
- **Traffic in the Arctic Sea** increases steadily and the logistical importance of the Northern Sea Route increases (Chinese interests, Arctic Ocean Railway).
- **Private maritime areas of companies become more common** (e.g., submarine data centres, test areas of autonomous vessels), which affects the preservation of cultural heritage, among other things.
- The poor condition of the maritime environment **reduces nature and cultural tourism** significantly. Increased tourism brings energy to the biggest cities, but the infrastructure and services in the archipelago weaken.
- The ecosystem of the Baltic Sea changes significantly and many key species, such as bladder wrack disappear. The Baltic Sea changes into **a warm and eutrophied sweet water basin**.
- **Demand for domestic fish** produced for food decreases and imported fish is eaten almost solely in Finland.

Impacts on MSP's objectives

BLUE GROWTH
- The exploitation of natural resources is powerful and short-sighted. Operations are focused on large units and focal areas, such as extensive wind power areas, tourism hotspots and busy cruise and logistics routes.
- Industries become more polarized and concentrates: fish farming increases, for example, but the fishing culture withers; tourism and recreational opportunities are focused on certain areas and wealthy people. Regions become polarized as winners and losers in terms of trade and industry.
- Conflicts emerge between sectors with increased activity and deregulation. On the other hand, there are opportunities for synergy benefits between operators. Circular economy and cleantech innovations create opportunities.
- Ecosystem services deteriorate, which reduces the opportunities of blue economy, e.g., the negative impact of the deteriorated state of the sea on fish farming, impact of environmental deterioration on tourism.

STATE OF ENVIRONMENT
- The ecological state of the marine environment is disturbed and water quality decreases, oxygen loss areas increase, diversity decreases.
- Natural values may strengthen in the outlying areas with the reduced use.
- The archipelago and outlying areas become deserted, which endangers to the cultural environment and heritage of the areas.
- The powerful development of sea transport and the increased tourism increase carbon dioxide emissions to air.
- Large-scale operations allow maximal raw materials efficiency. Citizens' movements may become active as the condition of the environment deteriorates, putting pressure on the operation of big businesses. It is possible that big corporations start investing on sustainable operating methods and technology, which will promote the improvement of the environment.

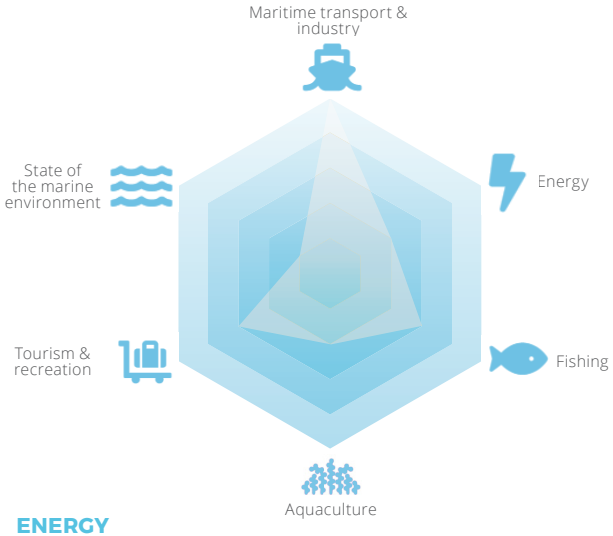
PEOPLE'S WELL-BEING AND PARTICIPATION
- Benefits from the natural resources are steered to big businesses at the expense of the local environment and local operators.
- Business directedness generates jobs on the hotspot areas, whereas services disappear from the archipelago and outlying areas and living conditions deteriorate.
- Everyman's rights deteriorate due to privatization.



Indicative opportunities of scenario 1 identified based on the workshops with regard to the state of the environment, blue growth and people's well-being and participation.

Scenario 1 *The Gulf of Finland*

DESCRIPTION OF THE AREA



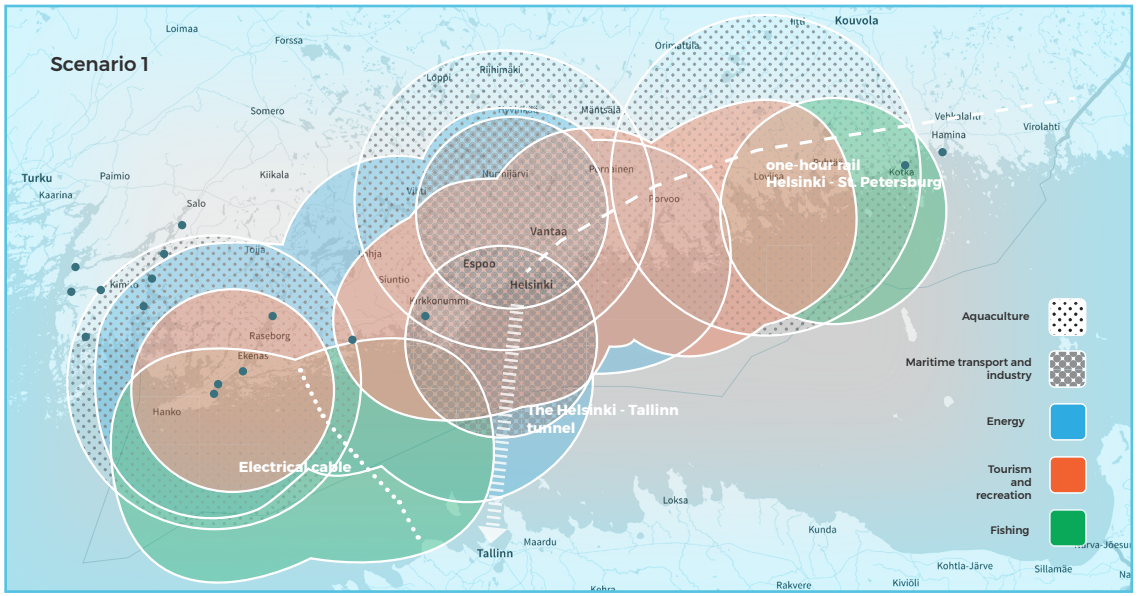


Illustration of scenario 1 on the map

ENERGY

Wind power is difficult to develop in the Gulf of Finland due to restrictions of the Finnish Defence Force, inhabitation and migratory paths of birds. Offshore wind farms are mostly placed in the western parts of the Gulf of Finland in front of Helsinki, Porkkalanniemi and Hanko, although companies are not willing to invest on wind power in such restricted conditions. Import of energy from Russia is emphasised and new investments are made on the Loviisa power station.

MARITIME TRANSPORT

The growth of maritime transport causes the need to build additional port infrastructure (especially for passenger traffic) and to obtain new areas of expansion for ports. Accident risks on the Gulf of Finland increase with the increasing maritime traffic (increased risk of oil and chemical accident). Autonomous vessels also create a new kind of safety threat to the busy Gulf of Finland. The Helsinki–Tallinn tunnel and Rail Baltica (Warsaw to Tallinn) increase passenger traffic. Traffic integration also possibly contains a one-hour rail connection to St. Petersburg and an electrical cable under the Gulf of Finland. Commuting moves to the faster train connection and some work-related travel and leisure travel continue on ships, which keeps the ship traffic volumes close to the current level. The volume of touring cruise ships has increased.

STATE OF THE MARINE ENVIRONMENT

The state of the maritime area clearly collapses in the Gulf of Finland: the salt content decreases, species decrease, eutrophication accelerates and alien species become more common. Especially the growth of the capital region (traffic, erosion, littering etc.) and the increase in hazardous substances with the increased maritime traffic cause a burden to the Gulf of Finland. Agricultural load is particularly important in the eastern Gulf of Finland (catchment basins). The growth of St. Petersburg increases challenges related to waste water in the Baltic Sea. Water pollution from forestry and the use of peat also increases in the Gulf of Finland.

FISHING AND AQUACULTURE

Fish species are in poor condition due to the poor state of the maritime area, which weakens the possibilities for fishing in the area. Various alien species may be found in the Gulf of Finland due to the increased maritime traffic. Leisure fishing increases slightly especially in front of Hanko and Kotka, but the poor condition of the sea reduces the popularity of fishing. Foreign demand for fish is strong, which is reflected in the increase of aquaculture in the area. Aquaculture facilities are set up in the most profitable areas of the Gulf of Finland, in front of Porvoo, for example. Due to the development of technology, blue mussel and algae are farmed for use in the cosmetics and pharmaceutical industries, among other things.

TOURISM AND RECREATIONAL USE

The negative effects of climate change elsewhere bring tourists to Finland. The large tourist volumes to the Gulf of Finland cause a burden to the maritime environment, and the region has to balance between the increased tourism and sustainability. The negative impact of large cruise ships are reflected on the nature and the submarine cultural heritage. The cities of the Gulf of Finland and the nearby archipelago benefit from the increased cruise travel, and one-day stops in Finland energise the companies of the region. Industrial tourism attracts foreign tourists in Loviisa and Kotka. Recreational use of the sea has diminished in the Gulf of Finland due to the degeneration of the ecosystem. The privatisation of maritime areas weakens everyman's rights and makes recreational use and private boating more difficult. Massive cruise travel may also reduce recreational use if the cruise ships cause considerable waste water discharges.

CULTURAL HERITAGE

The depopulation of the archipelago endangers built heritage. Cultural history sites (incl. war history) may become sites of major interest for tourists, and new technologies are used to model cultural heritage into the virtual environment.

Impacts of scenario 1

	SECTORS				MSP'S OBJECTIVES		
IMPACTS	**Energy**	**Fishing and aquaculture**	**Tourism, recreation and cultural heritage**	**Maritime transport and industry**	**Good condition of the sea**	**Blue growth**	**People's well-being and participation**
RISKS	• Increased maritime traffic makes increasing wind power difficult in the Gulf of Finland. • Conflicts between wind power projects and defence. • Energy production (offshore wind power) moves away from the biggest areas of consumption just like nuclear power (Helsinki metropolitan area).	• Fishing culture, competence and small-scale coastal fishing diminish.	• The deterioration of the environment reduces the attraction of tourism. • Increased tourism wears out the nature and cultural environments. • Cruise tourism does not generate income for local operators. • Centralisation of tourism decreases the versatility and local nature of the tourism trade.	• Increased accident risks (in front of Kotka, for instance). • Impact of the development of the Northern Sea Route for the Gulf of Finland. • Emissions of the mining industry pose a risk to the environment. • The tunnel to Tallinn may make it more difficult to operate the harbours in the region. • Privatisation of infrastructure and harbours poses a risk.	• The exploitation of natural resources is powerful and short-sighted, which leads to a disruption of the ecological status and a reduction of water quality. • The centralisation of operations increases the pressure on the environment in the focal areas (esp. Helsinki and Kotka regions). • Risk of oil accidents increases in front of Kotka, for instance. • Release of sedimented harmful substances being released into the sea poses a risk.	• Increased activities and reduced regulation result in conflicts between sectors. • The tunnel to Tallinn may weaken the harbours in the region and increase competition in the Gulf of Finland. • Financial benefits are lost from the region.	• Diminished participation opportunities (foreign decision-making and lack of local knowledge). • Polarisation of the region and weakening of services at the margins of the region. • Reduced living satisfaction and attraction. • Cultural impoverishment.
OPPORTUNITIES	• Big capital makes it possible to build in the exclusive economic zone. Possibility to include expensive radar compensation.	• Increased self-sufficiency and opportunities for success for specialised companies. Blue economy innovations.	• Well-maintained, attractive cultural centres: Kotka-Hamina, Porvoo and Hanko, counterbalancing the big cities of the Baltic Sea.	• Well-maintained, attractive cultural centres: Kotka-Hamina, Porvoo and Hanko, counterbalancing the big cities of the Baltic Sea.	• With the centralisation of activities, the reduced use of the marginal areas may lead to an improvement of the environment. • Improved raw material efficiency. • Globalisation of environmental activism creates pressure for sustainable operating methods.	• Centralisation of activities strengthens businesses especially in the Helsinki and Kotka regions. The small towns of the Gulf of Finland benefit from increased cruise tourism. • New commercial forms of use for blue-green algae. • Lease and sales income for water body owners.	• New jobs especially e.g. in the Kotka region in addition to the capital area. • Improved connections from Finland to Europe.

Impacts of scenario 1 identified in the workshops for the Gulf of Finland region.

DESCRIPTION OF THE AREA

ENERGY

With the onshore wind power capacity fully utilised and increased energy prices, there is more interest towards offshore wind power. Offshore wind power is constructed to the Archipelago Sea and the southern part of the Sea of Bothnia, but less attention is paid to conservation. The shallow depth is beneficial for the construction of offshore wind power. In the Sea of Bothnia, offshore wind power is placed in front of Pori and Rauma and loosely from Uusikaupunki to Pori, perhaps also Merikarvia. More and more land is owned by big corporations which, in this region, may mean that maritime industry companies are interested in acquiring strips of land on the shore.

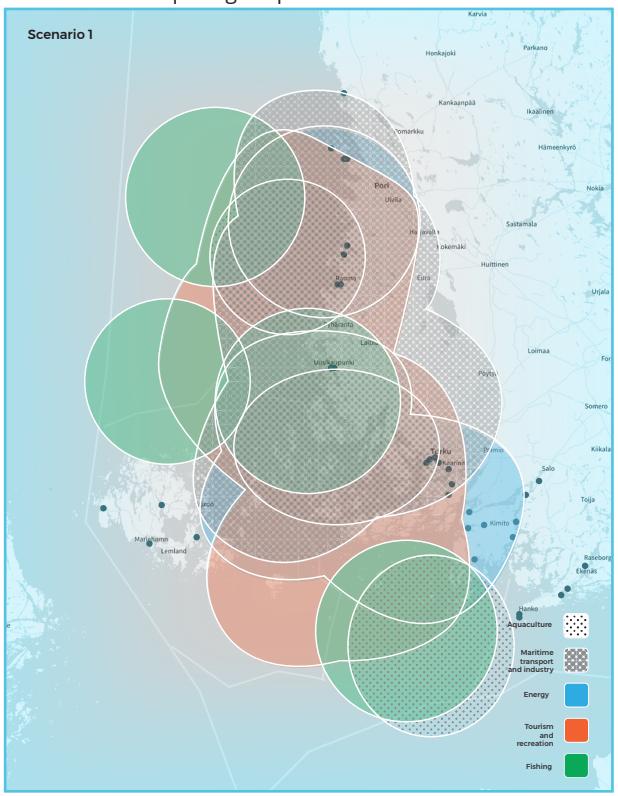


Illustration of scenario 1 on the map

MARITIME TRANSPORT AND INDUSTRY

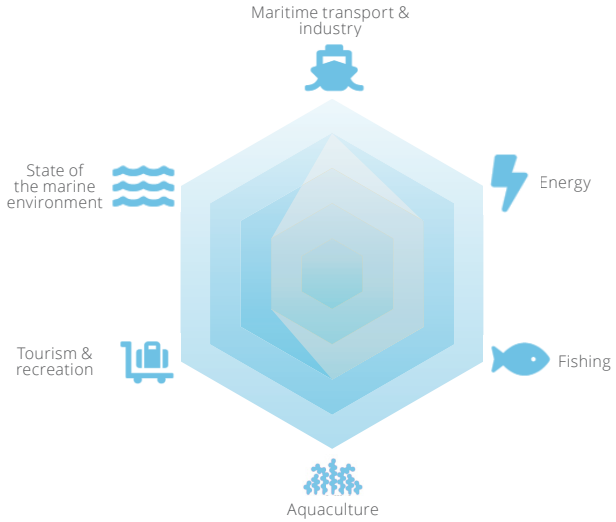
Both autonomous and traditional vessels are seen in the maritime area, which increases the monitoring of sea transport. The Archipelago Sea area benefits from new remote control centres as the area has extensive competence and education in the field of shipping. On the other hand, the region is challenging for automated sea transport. Maritime industry and new maritime transport solutions generate lots of vitality in the area, and with university education in the field, the area becomes an internationally renowned centre of blue technology and modern shipping. The reduction of the ice layer increases the number of vessels moving in the area, and in the future, vessels will be able to operate without ice classification and with smaller engines, thereby causing less emissions. The increased sea traffic also increases the risk of accident in the archipelago. Ports are merged and some move to foreign ownership.

STATE OF THE MARINE ENVIRONMENT

Climate change causes significant effects on the area. Dry seasons as well as runoff flows during the rainy season increase. The effect of agriculture on the archipelago increases. The destruction of the marine environment continues and the condition of the seafloor deteriorates in particular. The seafloor is full of filamentous algae and most of the floor is dead.

FISHING AND AQUACULTURE

The possible dismantling of the quota-based regulation system under the companies' terms threatens the sustainable fishing of fish populations. The utilisation of fish stock is controlled by the perspective of companies' long-term profit maximisation. Logistics develop and production volumes increase driven by big companies, which allows the launching of new fish-based products through local university cooperation. The competence of the universities of Turku support the development of high added-value products (such as using algae in biofuels). Aquaculture potential is already largely in use in the Archipelago Sea and the focus moves to southern Sea of Bothnia and large farming units. The aquaculture facilities in the area attract foreign investors. From the perspective of livelihoods, the significance of the shore reduces, which weakens the regional economy.



TOURISM AND RECREATIONAL USE (INCL. CULTURAL HERITAGE)

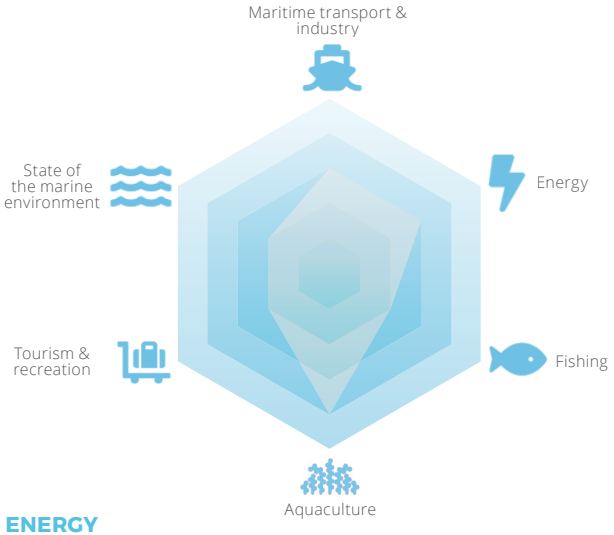
The preservation of the archipelago's cultural heritage and traditional means of livelihood are at risk. Tourists choose large cruises which result in little benefit to the ports or tourism businesses of the archipelago. Mass tourism focuses on a couple of easy-to-reach targets (such as Örö and Utö). In addition, "artificial" tourist attractions are created. The other forms of use of the maritime area restrict tourism. Permanent habitation of the archipelago reduces and further weakens the service offering. On the other hand, the vitality and attractiveness of cities in the Baltic Sea area increases, which brings opportunities to the archipelago near Turku, among other things. Other cities are also interesting in terms of cultural heritage (e.g., Rauma), but this requires good connections either via the cruise or over land. Activism tourism, on the other hand, brings people to the archipelago for various kinds of nature management tasks.

Impacts of scenario 1

	SECTORS				MSP'S OBJECTIVES		
IMPACTS	**Energy**	**Fishing and aquaculture**	**Tourism, recreation and cultural heritage**	**Maritime transport and industry**	**Good condition of the sea**	**Blue growth**	**People's well-being and participation**
RISKS	• The most optimal offshore wind power projects are not created without regulation of the authorities. • Privatised areas controlled by big businesses.	• Reduced coastal fishing, overfishing, loss of small local processors. • Increased risks in big units as well; an environmental accident may cause wide-ranging effects. • Increased cultivation is a risk to the water quality and diversity of the Sea of Bothnia. • The sea is in such poor condition that fish cultivation declines. The spawning of fish also becomes more difficult.	• The depopulation of the archipelago endangers built heritage and traditional biotopes. • Natural values may become secondary in areas of mass tourism. • Diminished opportunities for local recreation.	• Risk of major accidents, especially in terms of automated transport with larger vessels. • Excavation in the sea (e.g. of sea sand) without appropriate regulation leads to loss of shallows and their species. • Docks and boat sales may decrease if the maritime areas are in poor condition/ privatised.	• Environment and natural protection fall behind economic growth. • Global operators have no connection to the local environment or communities. Things are not seen locally and the environmental impacts are ignored. • In large-scale production, the risks are also high in the event of an accident. • Reduced significance of EIA leads to risks.	• The poor condition of the maritime environment reduces opportunities for livelihood. • Lack of regulation reduces opportunities for operation. • New industries, such as mining, get into conflict with traditional, growing industries such as fishing and aquaculture. • Sustainable growth is not possible; the sea cannot sustain even the current activities.	• The poor condition of the sea reduces well-being and drives archipelago residents away. • Periods of blue-green algae may become more common, reducing the opportunities for recreational use of the sea. • Privatisation of areas restricts operations, such as tourism, recreation etc. • Over-emphasis on the economy may lead to reduced safety. • Polarisation of areas: good areas for the rich, less opportunities for recreation for normal people.
OPPORTUNITIES	• Development of the sector and new innovation.	• High volumes allow advanced technology and an environmentally sustainable level, and the side streams generate high volumes for utilisation. • Purer protein production is possible in large units.	• Development of tourism for cities in Satakunta (Rauma, Pori, Yyteri). • Possibility to develop an international ring route: the Sea of Bothnia, the Archipelago Sea, Åland, Sweden.	• Mergers of harbours, economic growth, employment, network impacts of the cluster.	• Large capital allows the development of more ecological production methods. • Natural values are retained in the marginal regions.	• With climate change, the north will become a global food resource. • Some economic sectors may grow sustainably, e.g. shipping with the help of automation. • Cleantech and circular economy operating models. • Utilisation of algae has potential (requires further development).	• Employment effects of big businesses. • Pressure on big businesses to create sustainable operating methods. • Engaging residents in economic development projects through genuine participation by means of the social sustainability actions of companies.

Impacts of scenario 1 identified in the workshops for the Archipelago Sea and southern Sea of Bothnia

DESCRIPTION OF THE AREA



ENERGY

The technically and economically easiest offshore sites are utilised for energy production (the closest available space near the shore in shallow areas). Offshore wind power increases in front of Kemi-Tornio and Raahe, Pietarsaari and Kaskinen in particular. Industrial greenwashing projects with a climate perspective are constructed near existing industrial and port infrastructure. Other environmental values and comprehensive coordination are neglected in the placement of industry.

MARITIME TRANSPORT

Vessel traffic between states also increases in the northern maritime area and the Vaasa–Uumaja connection is developed further. The transport of goods is transferred nationally to more loosely populated regions. The development of the area proceeds under the terms of big businesses, and the interests forest industry, for example, are strongly reflected in area planning. Some of the northern ports have been sold to foreign ownership and large port entities are doing well. The operation of small ports gets more difficult and port mergers take place in the area. The volume of touring cruisers increases and some also stop for a day in the northern ports. Autonomous shipping increases significantly in the Bay of Bothnia (after the introduction of test areas) and some routes are operated with autonomous vessels.

STATE OF THE MARINE ENVIRONMENT

Many problems of the Baltic Sea aggravate and the sea gets sweeter. Floods are a major problem in the northern maritime areas. The increased rainfall also reduces the Baltic Sea's salt concentration and increases the runoff of nutrients from the ground. The shallow maritime areas in the north suffer the most when the condition of the sea deteriorates.

FISHING AND AQUACULTURE

Commercial fishing for food ends or changes into fishing of forage fish, which increases significantly. The removal of migration barriers is cancelled and migratory fish populations decrease even further. Typical sweet water fish species become more common (vendace, pike, pike-perch, bass) and the fishing of vendace increases in particular; vendace is trawled further away from the shore. Open sea fishing focuses on the Kvarken. Leisure fishing decreases due to the deterioration of the sea and loss of skills. The increased water temperature hinders aquaculture in the south and the pressure to move towards the north increases. The placement of aquaculture facilities is determined based on profitability and production focuses in the front of Kaskinen/Kristiinankaupunki near offshore wind farms, in front of Pietarsaari and most powerfully to the Bay of Bothnia, north of Hailuoto. The grey seal population grows in the north, making coastal fishing more difficult.

TOURISM AND RECREATIONAL USE

Tourism focuses on the largest cities (Oulu and Vaasa). Marine military and cultural sites are taken into tourism use. International tourists take over the maritime sites, even at the expense of recreational use by residents. "Arctic Sea" gains popularity as an incentive travel destination and supporter of positive image of big corporations. Seals are marketed as an attraction to lucrative hunting tourism.

CULTURAL HERITAGE

Cultural history sites which can be reached easily become a major interest of tourists, which leads to endangering them without strict guidance. Use of the Bay of Bothnia national park increases. Even Unesco sites may be endangered due to increased industry and tourism.

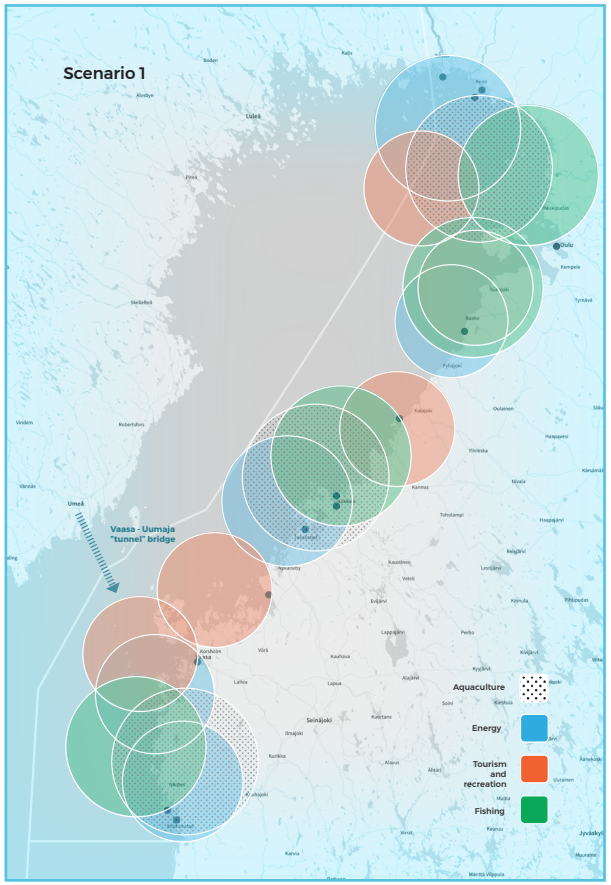


Illustration of scenario 1 on the map

MARITIME INDUSTRY AND MINERALS

The extraction of sand from the sea increases in the Bay of Bothnia as the minerals industry expands to the sea. Port operations and maritime industry need more and more space, and they cannot focus solely on southern cities or near residential areas. More sparsely populated areas may also receive investments. With the foreign investments, also profits leach abroad, which causes problems to the economy with the disappearance of tax base.

Impacts of scenario 1

	SECTORS				MSP'S OBJECTIVES		
IMPACTS	**Energy**	**Fishing and aquaculture**	**Tourism, recreation and cultural heritage**	**Maritime transport and industry**	**Good condition of the sea**	**Blue growth**	**People's well-being and participation**
RISKS	• Excess production may cause problems. • The Baltic Sea as a source of energy, on the operator's terms, at the environment's expense. • Energy production may even threaten defence operations.	• Excess growth puts pressure on the environment. • Profits of companies in foreign ownership move abroad at the environment's expense with no benefits for the local economy.	• Small operators get in trouble. • Excessive utilisation and productisation of the cultural heritage. • Increased maritime transport and construction of wind power are a risk to cultural heritage.	• Melting of the Northern Sea Route moves maritime traffic away from Bay of Bothnia harbours. • Negative effects of the utilisation of sea sand on the marine habitat.	• The state of the maritime environment and water quality will decrease significantly: increased oxygen loss areas, reduced diversity. • The poor state of the maritime environment is reflected in ecosystem services and livelihoods, e.g. the collapse of fish populations.	• Sustainability-based economy is not realised. The use of natural resources is unsustainable. • The poor state of the sea restricts livelihoods (e.g. aquaculture, fishing, tourism). • Private areas restrict operations.	• Degradation of livelihoods in the remote areas. • The poor state of the maritime environment reduces people's well-being. • Recreational use is decreased due to green-blue algae, for example. • Weak regulation, decreased participation. • Everyman's rights are at risk. • Impacts of climate refugees.
OPPORTUNITIES	• General good development of energy. • Opportunities of decentralised production	• A global marketplace. • Development of more sustainable fish farming techniques	• Large tourism volumes create possibilities for the necessary infrastructure. • Centralisation of tourism saves the marginal regions. • "Industrial tourism" (interest towards industrial facilities) will increase.	• New industrial investments will promote employment and livelihood in the regions.	• Development of environmental innovations. • Increased awareness of environmental issues among consumers. • Observing environmental values may create a competitive edge for big businesses.	• Expansion of commuter area (Vaasa-Uumaja) and competence will increase. • Circular economy opportunities. • Synergies between different operators. • The poor state of the sea may force new innovation.	• Strengthening of businesses in the Oulu region. • Rise of citizens' activism. • Sense of community may arise to counterbalance big businesses. • Economic growth may create well-being (at least temporarily).

Impacts of scenario 1 identified in the workshops for the Northern Sea of Bothnia, the Kvarken and the bay of Bothnia

Scenario

2

Profitability under the environment's terms

MARITIME AREA FUTURE TABLE

DEVELOPMENT OF MARITIME LOGISTICS	SECURITY SITUATION	TOURISM AND RECREATIONAL USE	INTERNATIONAL TRADE	ENERGY SECTOR	ATTITUDES AND ENVIRONMENTAL ACTIONS	CONDITION OF THE MARITIME AREA	CLIMATE CHANGE IN THE BALTIC SEA	FISHING AND AQUACULTURE	URBANIZATION
Uncertain and centralised maritime logistics (strategic importance of fairways is emphasised)	**Baltic Sea of peace** (focal point of security politics is elsewhere)	**New tourists find the Baltic Sea archipelago** (increased popularity of nature tourism)	**Stronger cooperation within the EU** (EU sticks together in the midst of global protectionism)	**Energy unionformed byinfrastructure projects** (moderate increase of offshore wind power in restricted areas)	**Greener through regulation** (strong role of the EU and the state in protection)	**Baltic Sea weakens** (eutrophication and oxygen loss aggravate)	**Moderate change** (climate change has no significant effect on the weather)	**Sea as a breadbasket** (fish as environmentally friendly mass production, fish as replacement of meat)	**Biggest coastal cities keep their vitality** (ageing population moves to nearby cities)
The volume of maritime logistics increases at the companies' terms (logistics networks of the companies)	**Increased tension in the Baltic Sea area** (cooperation more difficult, hybrid influencing)	**Tourism in the Baltic Sea becomes more difficult** (less recreational use of the maritime area)	**International trade** (global markets in the Baltic Sea)	**End of combustion and electrification** (subsidised grid connection of offshore wind power, farms further out on the sea)	**Profitable and green** (new business under the terms of responsibility)	**The status stays poor** (blue-green algae blooms and nutrient load)	**Significant changes** (effects of climate change reflected on the Baltic Sea)	**Changing fish population and steady increase of aquaculture** (large units optimal, with profitable locations)	**Strong concentration on the metropolis,port cities die down** (big cities expand, immigration)
Reduced environmental effects of maritime logistics (circular economy, local production,small volume transport)	**Congested Baltic Sea** (new security policy situation, climate refugees)	**Tourism concentrates in the biggest cities around the Baltic Sea** (increased cruise tourism, interest in the culture)	**Ecological footprint steers consumption** (local production and consumption, new technological solutions)	**Moderate energy transition** (offshore wind power under the terms of companies, no subsidised grid connections, small farms near the shore)	**Ineffective environmental policy** (large-scale offshore wind power projects cannot be started)	**Improved condition of the maritime area** (successful reduction of load and recovery of the sea)	**Radical change** (heavy rainfall, floods, major seasonal variation)	**Flourishing leisure fishing and strict regulation of aquaculture** (return of Baltic herring as food, fish farming on the ground in closed water systems)	**Increased popularity of the archipelago** (transition of work life, living in many places, people seek access to pure nature)

Developments emphasised in scenario 2

National description

SOCIETY AND POLITICS

Concern over the environment is increasing and climate issues become a central focus of politics. The state participates actively in different methods of conservation, and private persons, municipalities, parishes and companies also become active in natural conservation. Consumers are more and more environmentally aware and the ecological footstep steers consumption (e.g., cruise compensations). People's personal choices also strongly guide companies towards providing sustainable solutions. New business models are searched under the terms of sustainability, and Finland is a forerunner in the development of sustainable technology. Current cleantech and biotechnology clusters gain strength (e.g. algae farming). The security status on the Baltic Sea is stable as the attention of superpowers is focused elsewhere.

ENERGY

Forms of renewable energy production (incl. solar and wind power) become significantly more common and emission-free forms of energy become cheaper. As storage technology improves, the production of energy becomes decentralized, and the improved storage capacity also increases the demand for wind power. The search for renewable forms of energy is strong by means of environmental policy and the state supports the connection of offshore wind power to the grid (e.g., Denmark). Due to the investment environment favourable to offshore wind power, the stabile security situation and the development of technology, production is profitable also further from the shore. The combination of wind power and other forms of energy gives integration benefits with the increasing electric maritime transport, for example. Wind power farms also become more and more tourist attractions.

MARITIME TRANSPORT

The harmful impacts of maritime logistics on the environment reduce as a result of improved environmental awareness, technological development, cleaner fuels, local production and circular economy solutions. Vessel traffic increasingly switches to fuel cells and nuclear power. Small volume transport becomes more and more common, which moves the load from the sea to the air and also improves the accessibility and services of the archipelago. Technological development, such as industrial scale 3D printing and new circular economy solutions improve access to resources, but also increase the transport of waste on the sea. Local traffic and logistics are emphasised.

CITIES AND POPULATION

Urbanization continues, but people seek clean nature in increasing volumes. New housing trends (such as living in several places, compact small houses, cottages for round-the-year use) and the transformation of work life (remote work etc.) increase the popularity of the archipelago also for living. Infrastructure, traffic connections and services improve in the archipelago and pedestrian and bicycle traffic increases.

Scenario 2 *Profitability under the environment's terms*

THE ENVIRONMENT AND CONDITION OF THE MARITIME AREA

The state of the Baltic Sea is seen as an international environmental issue, and the total benefits of a clean sea are mainly recognized in all the Baltic Sea countries. Conservation measures are promoted significantly, and shared monitoring systems with impact are constructed. The harmful impact of climate change on the weather at the Baltic Sea also turns out to be less severe than expected. Agricultural nutrient load and other activities causing load on the ground reduce (incl. changes in eating habits, stricter water protection in the agriculture, improved purification of municipal sewage, circular economy solutions), which promotes the improvement of the maritime area's condition. Eutrophication is managed and blue-green algae are no longer an issue every summer. Increased awareness also reduces the littering of the Baltic Sea. The processing of sewage of (passenger) vessels also improvesand the spreading of alien species is brought under control.

FISHING AND AQUACULTURE

Natural fish populations gain strength and professional and leisure fishing increase within the boundaries allowed by the environment when the demand for wild fish increases. The increased consumption of natural fish and fishing, on the other hand, remove nutrients which have already ended up in the Baltic Sea. The popularity of Baltic herring in food also increases when toxicity levels decrease and cyprinid populations diminish. The vitality of the archipelago guarantees good opportunities for fishing entrepreneurs, but also private and coastal fishing increase within the boundaries allowed by the environment in the archipelago and the Bay of Bothnia in particular. Strict environmental regulation restricts the increase of large-scale aquaculture on the sea and fish farming in closed water systems becomes more common, especially on the ground. The combined production level of aquaculture remains unchanged, focusing on the open sea where it causes the least harm to the marine environment. Aquaculture is increasingly located by wind power parks in the open sea.

TOURISM AND RECREATIONAL USE

The calm and clean environment and the service packages offered by archipelago residents in digital platforms attract new tourists to the Baltic Sea from nearby countries (incl. cultural and nature tourism). The culture of shared use blooms in the capital region in particular where digital peer-to-peer services have become a part of daily life (e.g., skipperi.com and doerz.com). With the increased climate awareness, Finns also start to favour tourism in nearby regions which increases the popularity of the archipelago as a recreational area. Local culture and nature tourism services are appreciated and also traditional trades gain strength. As tourism businesses increase, the majority of tourism concerns the Archipelago Sea and nature sites.

DESCRIPTION OF THE PLOT

2019-2025

Effects on the environment become the focus of politics and investments are made on circular economy

- **Climate anxiety and concern for the environment increase** and more and more people are willing to reduce their carbon footprint. Climate issues also become the focus of politics and regulation increases.
- **Clean forms of energy production** become even cheaper and renewable energy is also promoted by means of strong environmental politics.
- The state introduces **a subsidy for connecting offshore wind power to the grid** (e.g., Denmark). The development of electric traffic (incl. infrastructure) is also strongly subsidised.
- Consumer's demand for environmentally friendly solutions also strongly guides **companies towards providing sustainable solutions**. Different communities, regions, associations and companies become active in nature conservation (incl. the Baltic Sea).
- Personal eating habits are changed successfully and **the demand for domestic natural fish increases** also due to the higher taxation of meat. The compensation of consumption becomes increasingly popular also from the perspective of the conservation of the Baltic Sea.
- **The poor condition of the Baltic Sea is discussed more and more** as the blooming blue-green algae increases and hot summers become more common. A major oil or chemical accident also increases awareness of the state of the sea.
- **Investments in bio and circular economy as well as cleantech** research and development increase substantially. Local production (such as 3D printing) gains popularity due to the focus on resource efficiency and new innovations are created to replace harmful materials.
- **Long-distance travel loses popularity** due to the higher taxation of flight travel and the slowdown of economic growth, and domestic tourism destinations are developed widely.

2025-2035

Conservation actions and technological development promote the improvement of the state of the Baltic Sea

- **The state of the Baltic Sea is seen as an international environmental issue**, and the total benefits of a clean sea are recognized by most of the Baltic Sea countries. **Conservation measures** are promoted significantly and shared monitoring systems are constructed.
- **Several Baltic Sea countries**, such as Denmark, Sweden and Finland, **reach carbon neutrality** already in the 2030s as a result of significant increase in emission-free energy production and a radical change in consumer behaviour.
- As storage technology improves, the **production of energy becomes decentralized**, and the improved storage capacity also increases the demand for wind power.
- Thanks to the investment environment favourable to offshore wind power and the development of (turbine) technology, the profitability of offshore wind power improves significantly and **several new wind power farms are built on the open sea**. Floating wind and solar power stations are also developed.
- The price of electricity falls with the substantial increase in offshore wind power and (sea) **traffic becomes electrical**. The electrification of traffic also reaches to waters and **e-boats** can be charged in the archipelago marinas.
- **Small volume transport** also increases substantially, which moves the load from the sea to the air and also improves the accessibility and services of the archipelago. Tourism in the nearby regions becomes more popular.
- New housing trends and the transformation of work life **increase the popularity of the archipelago also for living**.
- Natural fish populations gain strength and **professional and leisure fishing increase.** The increased fishing of natural fish removes nutrients which have already ended up in the Baltic Sea.
- Strict environmental regulation restricts the increase of large-scale aquaculture on the sea and **fish farming in closed water systems becomes more common** as the availability of energy improves.

2035-2050

Decentralized housing, production and tourism increase pressure in the archipelago

- **Agricultural nutrient load and other activities causing load on the ground reduce** (incl. changes in eating habits, improved purification of municipal sewage, circular economy solutions), and the eutrophication of the Baltic Sea is brought under control.
- **Harmful environmental impacts of the industry are decreased substantially** by increased regulation, local production and introduction of business models based on circular economy. **Conservation areas** have been expanded and environmental requirements tightened significantly.
- **Maintaining a good state of the marine environment steers the development of operations** (cf. central treatment plants established and centralised port operations). Operations concerning the seafloor harmful to the environment are focused near urban areas and by the fairways.
- Renewable sources of energy (incl. solar energy, geothermal heat, wave energy) are utilised extensively and **the cost competitiveness of offshore wind power** surpasses that of nuclear power. With the development of energy storage technology, wind power farms are also used for the storage of energy.
- **Lifestyles and consumption patterns** related to housing, recreation, transport and food have undergone a profound change. Daily life is characterised by the sharing economy, digital platforms and shared use.
- **Living in several places** (incl. dual municipal residency) has become clearly more popular and the archipelago has round-the-year service provision and residents.
- The improved infrastructure also allows **commuting from the archipelago** (cf. Stockholm) and emission-free passenger and minor transport increase. **Load caused by tourism**, partly uncontrolled, increases in the archipelago in particular.
- Fish is mostly grown in **closed system facilities** on the ground.

Impacts on MSP's objectives

BLUE GROWTH

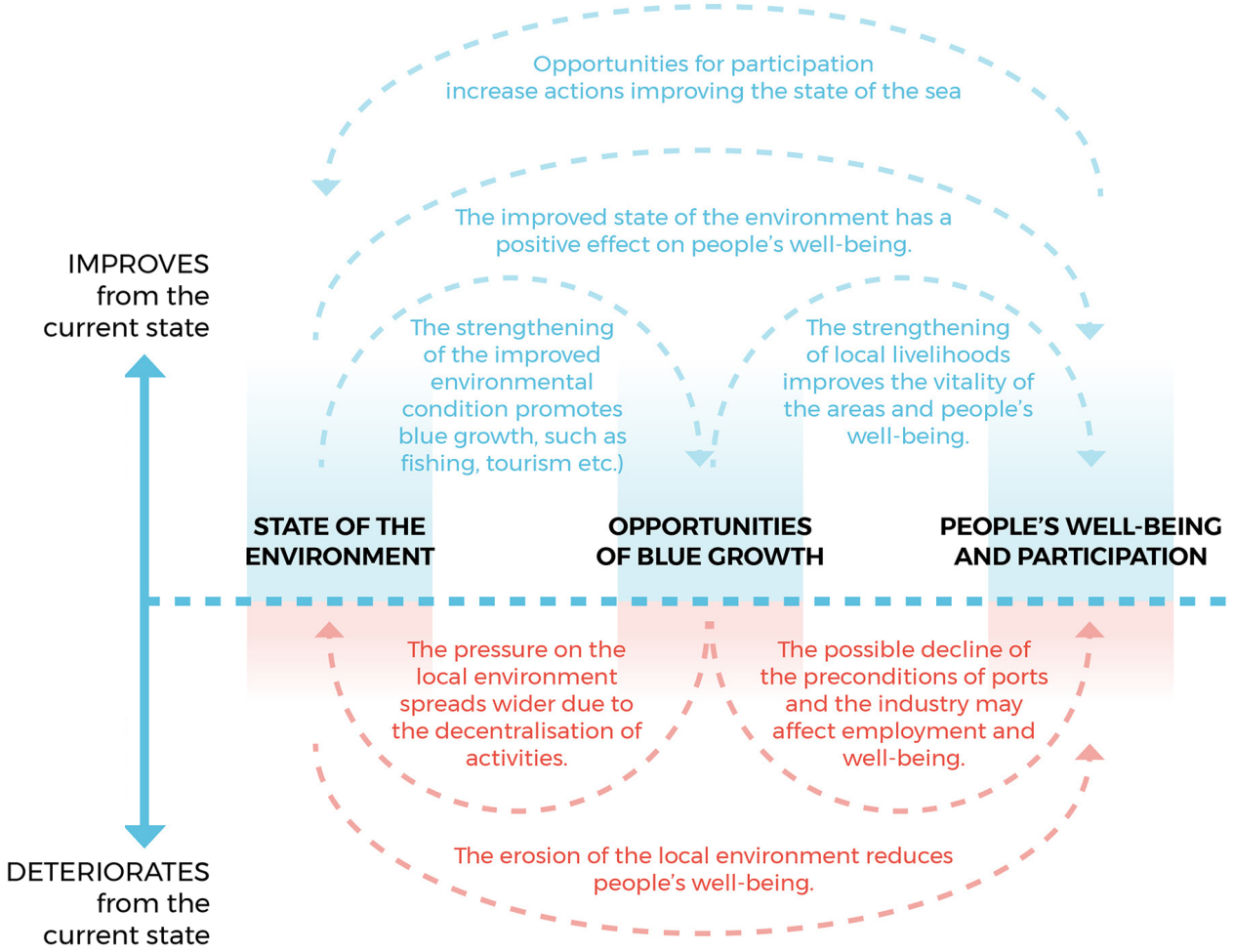
- Local businesses gain strength with increased regional and nature tourism the strengthening of local fishing trades, for example.
- The opportunities for blue growth are good in many sectors. The opportunity to be a forerunner in cleantech solutions and export competence.
- The construction of solar and wind power projects increases in line with the political will and environmental awareness. Some decentralisation can be observed in energy production but, on the other hand, also large facilities are built. Self-sufficiency in energy production may increase.
- Small-scale trades may not necessarily stay viable.
- The operation of the industry and ports as well as big companies may decline.

STATE OF THE ENVIRONMENT

- The negative effects on the environment generally decrease on a large scale with, for example, the electrification of transport and the reduction of ship emissions and the reduced carbon footprint of energy production. The state of the sea improves in general.
- Harmful environmental effects may increase locally as a result of erosion of the nature due to the extensive decentralisation of operations, such as that related to increased living and tourism in the archipelago and increased local traffic. Wind power stations also harm the coastal ecosystems, cultural environment and sceneries.

PEOPLE'S WELL-BEING AND PARTICIPATION

- The role of local operations and operators strengthens.
- The archipelago gains vitality as a result of the strengthening of local livelihoods and the increased living in the archipelago and development of services made possible by digitalisation. The communal archipelago culture grows stronger, which in turn supports the preservation of cultural environments.
- Increased self-sufficiency and local and small production have a positive effect on people's well-being.



Indicative opportunities of scenario 2 identified based on the workshops with regard to the state of the environment, blue growth and people's well-being and participation.

DESCRIPTION OF THE AREA

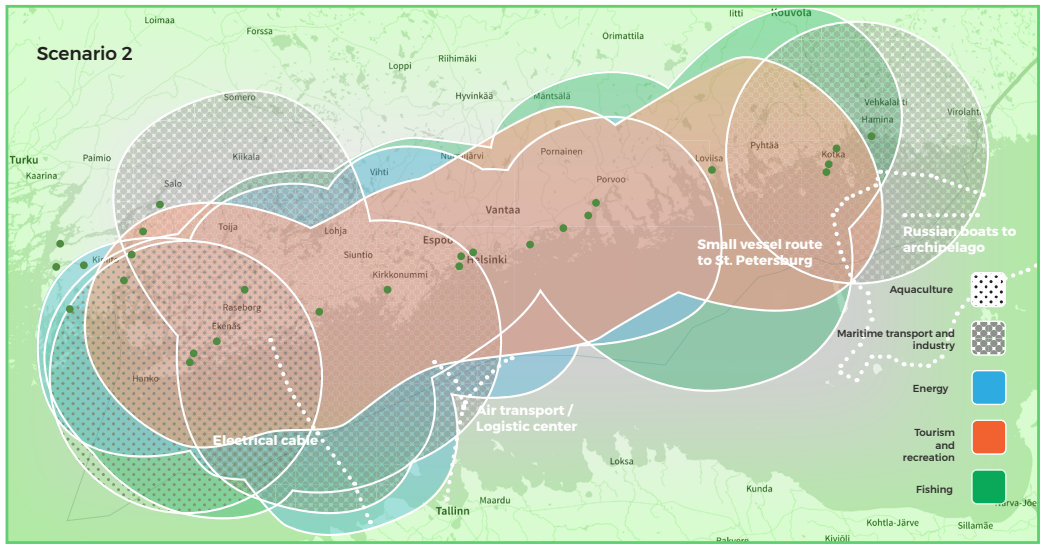
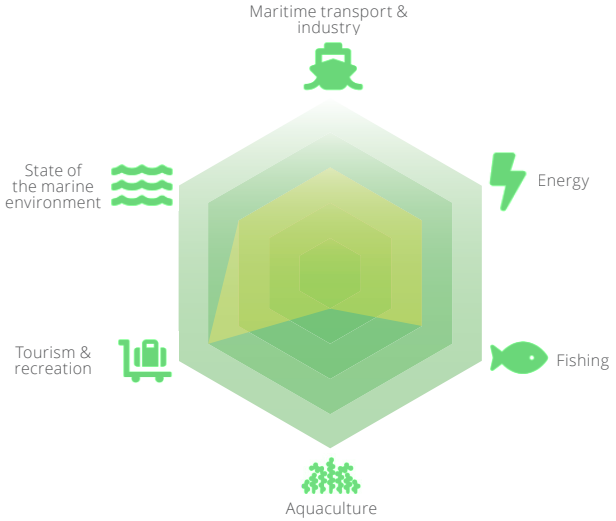


Illustration of scenario 2 on the map



ENERGY

Positive political guidance (e.g., subsidies grid connections, favourable taxation) allow the rapid development of wind power. Wind power is integrated with other energy production in the area to support the electrification of maritime transport. In addition to the western Gulf of Finland, offshore wind power is also constructed in front of Porvoo. With the development of energy storage technology, wind power farms are also used for the storage of energy (so-called modern grain silos). The increased electrical sea transport creates a need for maritime charging points alongside the fairways. Multi-use wind parks are an attraction symbolising the blue technology leap. Small nuclear power plants become more popular and the decentralized energy production creates new types of accident risks in the area.

MARITIME TRANSPORT

The increase of small transport causes logistical challenges in the densely populated Gulf of Finland area. Air transport creates new kinds of issues related to safety and control. The development of circular economy reduces vessel transport volumes, but does not replace maritime transport. New boating routes are created in the eastern parts of the Gulf of Finland.

STATE OF THE MARINE ENVIRONMENT

Natural fish populations are doing well and the harmful spreading of alien species has been prevented. Nutrient load from the ground has been reduced successfully, eutrophication is under control and algae is only observed moderately in the summer. New circular economy systems are created in the Gulf of Finland area supported by the good infrastructure in the area.

FISHING AND AQUACULTURE

Fish populations are doing well as a result of the improved state of the marine environment. The fragmentation of private water bodies, on the other hand, makes the situation more difficult for fishing enterprises. Recreational fishing gains popularity as people become interested in the archipelago, and the demolition of water power stations in the rivers further promotes fishing tourism. The Porkkalanniemi and Hanko territorial waters attract fishers. The stricter environmental regulation hinders aquaculture, but the stopping of the eutrophication development may enable aquaculture, but within the carrying capacity of the environment. The supply of fish farmed domestically still does not match the demand and lots of fish is imported from other countries. The cultivation of blue mussels is focused on western Gulf of Finland, in the front of Hanko in particular, whereas conditions are favourable for algae farming throughout the Gulf of Finland.

TOURISM AND RECREATIONAL USE

The archipelago of the Gulf of Finland is still quiet and, on the other hand, urbane conditions combine with the archipelago in Kotka, Hanko and Helsinki which together form an even tourism and recreational zone on the entire shore of the Gulf of Finland. Digital platforms and shared use allow the growth of tourism and recreation in the Gulf of Finland in particular due to the adequate residential base (such as skipper.com, doerz.com, bout.com). New forms of tourism, such as submarine nature trails, are introduced. Living in two places (and dual municipal residency) is emphasised especially in the Gulf of Finland. Digitalisation and the transition of working life promote the popularity of remote work, and the improved infrastructure allows commuting from the archipelago (cf. Stockholm).

CULTURAL HERITAGE

A new rise of archipelago culture: Interest towards traditional fishing, hunting and handicrafts methods increases, and these skills are kept alive and developed more and more. This helps the preservation of built heritage through use (sustainable use and repair). The value of cultural heritage sites and locally produced food, for example, increases. As a counterforce to urbanization, trends steer people back to the nature, increasing the understanding of natural values.

Impacts of scenario 2

	SECTORS				MSP'S OBJECTIVES		
IMPACTS	**Energy**	**Fishing and aquaculture**	**Tourism, recreation and cultural heritage**	**Maritime transport and industry**	**Good condition of the sea**	**Blue growth**	**People's well-being and participation**
RISKS	• Issues with birds may restrict the placement of very large wind power parks in the Gulf of Finland.	• Small-scale operations may not be efficient in terms of resources.	• The nature will suffer unless nature tourism is controlled. • The development of tourism is difficult due to low volumes.	• Increased local traffic may put pressure on the environment in the archipelago. • The role of harbours may diminish if vessels are used as distribution centres.	• Increased population on the archipelago threatens the nature. • Increased maritime traffic also increases the risk of accidents. • Small-scale nuclear facilities have an accident risk.	• Economic growth may not be infinite due to the regulation of quality properties. • The fragmented ownership of water bodies threatens (fishing) tourism.	• Reduced privacy and peace due to e.g. increased traffic and tourism.
OPPORTUNITIES	• Development of community-based wind power/solar power may increase with increased environmental awareness. • The political will is the strongest for clean energy.	• Increased interest towards locally produced food. • It may be possible to increase the catch volumes of some fish species. • Fishing as a livelihood and in terms of tourism will strengthen.	• All-year tourism may become possible as consumers are nearby all the time.	• Automatisation of maritime transport becomes possible for small vessels in addition to freight transport. • The circular economy brings opportunities for the renewal of industry. • Green energy for vessels.	• Improved ecological state of the maritime area creates a positive circle. • Eco-efficiency reduces harmful effects on the environment. • Different aquaculture methods (e.g. cultivation of algae and fishing) clean the water and the environment. • Reduced submarine noise.	• Tourism in the Gulf of Finland focuses on the Hanko, Helsinki and Kotka regions, strengthening the businesses. • Increased professional fishing in the Gulf of Finland. • Close integration of the cultural heritage with the development of tourism. • Extensive production of green energy.	• Multisectoral entrepreneurship in the archipelago and livelihoods based on the lifestyle. • Tourism income may be steered to small local operators. • Development of energy technology and education and work related to it. • Increasing the education related to small-scale production. • Village areas in shared use (autonomous villages).

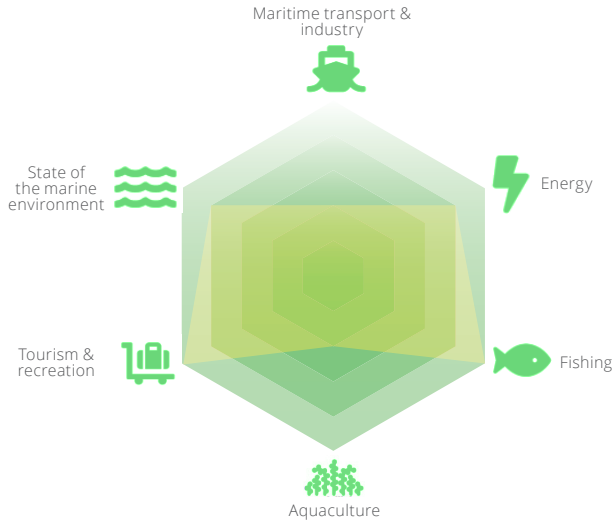
Impacts of scenario 2 identified in the workshops for the Gulf of Finland region.

DESCRIPTION OF THE AREA

ENERGY
Offshore wind power is built especially on the exclusive economic zone to the south from Åland and the Sea of Bothnia far from the shore, considering the environment and total economical (front of Pori and Rauma, from Uusikaupunki to Pori and on to Merikarvia). The state steers the construction (incl. subsidies), but also companies are realizing the potential of offshore wind power. The development of green technology has progressed so that building offshore wind farms further and further to the sea is profitable. This resolves the conflict between the nuisance/visual harm caused by offshore wind power and tourism in the area and thereby improves attitudes towards offshore wind power. The electrification of the archipelago becomes an issue when electric boats and habitation in the archipelago increase.

MARITIME TRANSPORT AND INDUSTRY
Small volume transport and the development of local production support living in the archipelago and services in the area. The archipelago has lots of opportunities for the testing and development of drone transport and different kinds of automation, which further increases the attraction of the area as a maritime competence centre and improves the opportunities to develop circular economy solutions. In this scenario, also minor maritime industry is dynamic in addition to large shipyards. Maritime industry in the area finds synergies with offshore wind power. Increased recreational boating increases safety risks at sea

STATE OF THE MARINE ENVIRONMENT
The state of the marine environment has also improved in the Archipelago Sea and the impacts of forestry and agriculture have been reduced as a result of a change in the political climate. People take care of the environment, move around and live in the archipelago ecologically (recycling, electrical transport etc.). The environmental load caused by communities is reduced and stores favour locally produced and sustainable products. The load caused by cruise tourism has been reduced and more and more cruise ships sail the Baltic Sea with the help of new environmentally friendly technologies. The submarine noise caused by sea traffic is brought under control.



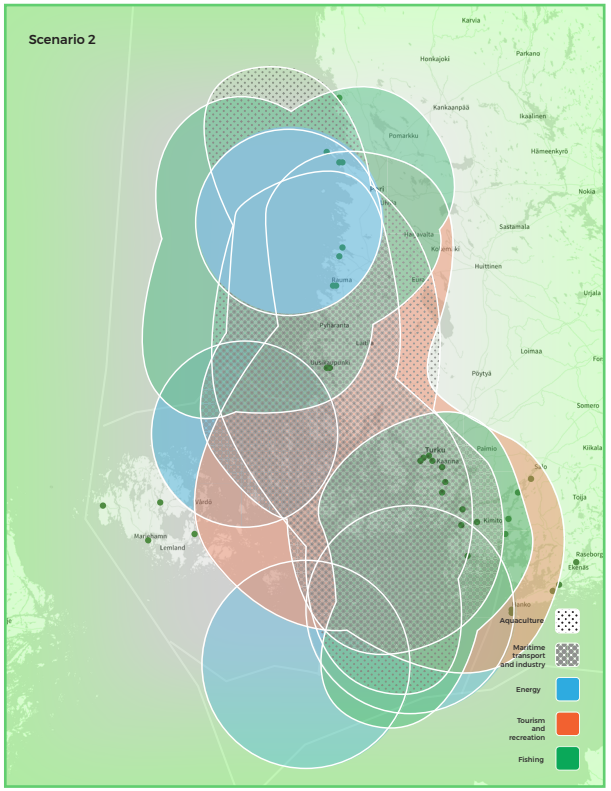


Illustration of scenario 2 on the map

FISHING AND AQUACULTURE
Professional fishing sustains and grows stronger in the archipelago, especially in the form of coastal fishing. The fisher trade becomes more varied and expands into the sales of tourism and recreational services and the sales of processed products. Young fish are grown in circulating water facilities at the coast, and further growing moves to the open sea areas of the Archipelago Sea and southern Sea of Bothnia. The Archipelago Sea attracts lots of recreational fishers. Fishers and aquaculturers work together, offering fishing trips. The increased nature and experience tourism also increases interest towards fishing as a trade and the aquaculture technology. Increased innovation also expands the opportunities to use fish, algae and mussels in the pharmaceuticals industry, among other things. University competence in the area supports the R&D work for new products.

TOURISM AND RECREATIONAL USE (incl. cultural heritage)
Sustainability is emphasised in tourism in the area and people use sustainable transport connections. Private boating becomes electric and e-boats and the increased popularity of sailboats put pressure on the addition and development of marinas in the area and the improvement of waste processing (such as sorting, sewage). Nature tourism increases with the improved diversity and the increased appreciation of the nature. Tourism destinations include several villages in the archipelago. Nature tourism is implemented in a decentralised manner, and people do not concentrate extensively on specific areas. Access to the most sensitive areas is restricted. The archipelago culture and long history of the area attract tourists, and cultural heritage becomes a naturally integrated part of the area's image.

Impacts of scenario 2

	SECTORS				MSP'S OBJECTIVES		
IMPACTS	**Energy**	**Fishing and aquaculture**	**Tourism, recreation and cultural heritage**	**Maritime transport and industry**	**Good condition of the sea**	**Blue growth**	**People's well-being and participation**
RISKS	• The business will not develop and the costs will not decrease if the subsidies are too generous. • Regulation may not be able to keep up with the increased offshore wind power. • Increased vulnerability in large systems.	• Strict environmental legislation prevents large-scale fish farming. • Education providers are not able to respond to the extended duties of a fisherman. • Small-scale operations are too expensive for the society. • The fish volumes are too low.	• Decentralised tourism burdens the environment everywhere evenly. • Significant increase of tourism in the Archipelago Sea is an environmental risk and requires successful harmonisation.	• Traffic will not decrease, but emissions may. • Increased rental boating impacts traffic safety.	• Decentralised operations, e.g. tourism, burden the nature. • Becoming lulled into believing that everything is good. Lack of maintenance of the natural values. • Unexpected impacts of new solutions on the state of the sea and the nature.	• Excess reliance on digital solutions. • Risks related to the utilisation of the exclusive economic zone. • Reduced production and competence if we fall behind development.	• Tourism causes problems for recreational housing. • Lack of competence, e.g. fishing. • Digitalisation may alienate people from the nature.
OPPORTUNITIES	• Possibility to develop many sorts of operations to the extensive power plant areas. • Increased innovation through subsidies. • Cables become possible from southern Åland to Estonia and Sweden.	• Fish farming is acknowledged as an efficient way to produce animal protein. • Nutrient emissions trading reduces the total nutrient load. • The sector seeks added value from other livelihoods (tourism) and increased degree of processing.	• The archipelago stays alive, which promotes the preservation of the cultural environment. • Improved water quality promotes tourism. • Recreational fishing near the coast creates opportunities for tourism.	• Focus on the increased degree of processing of products. • Small maritime industry companies stay viable and create jobs.	• A clearer and functional network of conservation areas. • Research will provide more information about the impact of operations and what operations can be performed side by side. • The good state of the maritime environment enables sustainable growth and well-being of people.	• The opportunities for blue growth are good in many sectors. • Competition creates pioneers and new solutions. • A model country of cleantech; demand for environmental solutions also elsewhere.	• Technology makes it possible to live, provide services and run a business in the archipelago. • Maritime experiences have a positive impact on general well-being. • The sharing economy promotes social tolerance. • Versatile opportunities for finding employment.

Impacts of scenario 2 identified in the workshops for the Archipelago Sea and southern Sea of Bothnia.

DESCRIPTION OF THE AREA

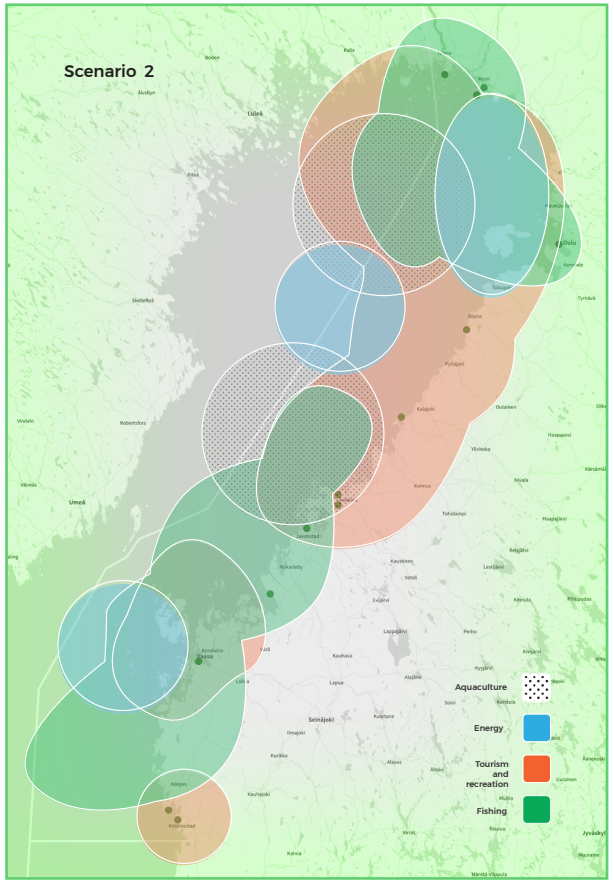


Illustration of scenario 2 on the map

ENERGY

Extensive offshore wind power areas are created in the open sea, and large wind farms are built at Kaskinen, Kalajoki and Oulu latitudes, for example. The coordination of wind power construction, other use and environmental values is emphasised in the maritime area. There is more research data concerning the maritime area and cooperation with Sweden has been realised. Peat, for example, is being developed into higher added-value products and it is no longer used as energy.

MARITIME TRANSPORT

The volume of maritime transport increases in general and some of truck traffic volumes transfers to sea transport. Traffic parallel to the coast as well as passenger and small transport increase. The clean sea in the area attracts tourists. Accessibility and services of the archipelago improve especially in the Kvarken.

STATE OF THE MARINE ENVIRONMENT

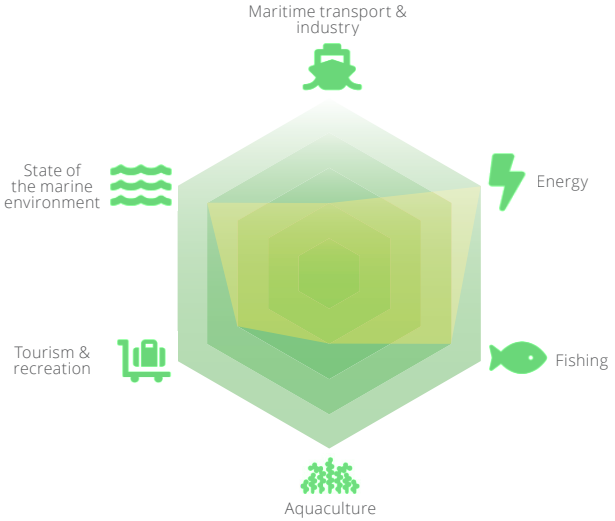
Hydraulic construction is controlled strictly so as not to endanger the ecological status of the area. Load from agriculture and forestry has been successfully decreased significantly, which improves the state of the maritime area. The visibility of coastal waters is very good. The maritime environment has the best state compared to other planning areas. Natural fish populations are improving, which promotes recreational fishing and demand for guide services.

FISHING AND AQUACULTURE

The environmentally friendly development and placement of fishing and aquaculture is strongly supported. Migratory fish population have recovered and migration barriers have been removed. Fishing activity is rich and it focuses on the Kvarken and the northernmost areas of the Bay of Bothnia. Utilisation of cyprinids increases. Identification of regional issues (such as seals). Environmental regulation restricts the increase of aquaculture and some aquaculture facilities are located in the Bay of Bothnia financial zone and in front of Pietarsaari.

TOURISM AND RECREATIONAL USE

Tourism and recreational use increase significantly in the area, focusing near the coast in connection with cities, archipelagos and nature conservation areas. The electrification of short-haul flights allows the growth of international passenger streams from a short distance. Climate change has not melted the ice layer of the sea, and maritime nature safaris (incl. offshore wind farms) attract tourists to the north in the summer and in the winter. “Icy desert” is a major attraction of the area. Tourists want to be a part of the local archipelago culture, and residents on the coast provide opportunities for this via digital platforms. Tourists stay in the area for longer periods of time and the clean marine environment is utilised extensively as a resource for arctic maritime tourism. Instead of and



in addition to tourism to the Archipelago Sea, tourism also attracts and brings people to the northern area.

CULTURAL HERITAGE

The sustainable use of national parks increases steadily with the increased domestic tourism. Foreign tourists also find their way to the area. Tourists are interested in cultural heritage sites, such as lighthouses and fisher villages. The good water quality and the unique submarine cultural heritage of the northern area also attract divers. The submarine cultural heritage is protected.

MARITIME INDUSTRY AND MINERALS

Maintaining a good state of the marine environment steers the development of operations (cf. central treatment plants established and centralised port operations). Developed process technology and chemistry create new opportunities for the minerals and maritime industries in the area where cleanliness is an obvious selling point. Operations concerning the seafloor harmful to the environment are focused near urban areas and by the fairways. Dredged material is placed sustainably (filling of ports, noise banks etc.) and is utilised to an even higher degree.

Impacts of scenario 2

	SECTORS				MSP'S OBJECTIVES		
IMPACTS	**Energy**	**Fishing and aquaculture**	**Tourism, recreation and cultural heritage**	**Maritime transport and industry**	**Good condition of the sea**	**Blue growth**	**People's well-being and participation**
RISKS	• Big units may be susceptible to disruptions, security of supply at risk. • Sensitivity to the economic cycle and profitability risks.	• Slow growth in the aquaculture business.	• Tourism burdens the nature. • Conflicts between local residents/ tourists. • Increased price level, high for the locals. • Construction of wind power stations threatens the cultural heritage.	• Decline of the industry, harbour and business activity. • Diminished opportunities for development.	• Local recreation and tourism negatively affect the nature. • Harmful impacts of wind power stations to the coastal ecosystems. • Traffic accident risks. • Environmental impacts of new dredging.	• High investment costs for businesses. • Increased conflicts between sectors.	• Businesses will no longer be viable in small scale. • Decentralised construction/ living are expensive to the society. • Effects of increased wind power on the scenery.
OPPORTUNITIES	• Functional self-sufficiency. • Cross-border cooperation and synergy benefits. • Increased innovation and development of alternative energy forms.	• Improved state of the maritime environment creates opportunities for sustainable fish farming. • Close relationship between the producer and the consumer. • Profits stay with the locals.	• Fishing tourism, utilisation of national parks and the Northern Ring Route (Finland+Sweden) benefit livelihoods related to tourism. • Successful control of the cultural heritage in the entire maritime area (Sweden-Finland) becomes possible. • Taking control of local competence.	• Improved maritime transport connections to Sweden. • Maritime transport and industries turn low-emission. • Increased passenger and small transport. • New business operations related to maritime transport and industry.	• Comprehensive improvement of the state of the environment. • Strengthening of fish populations. • Income streams allow investments promoting the natural state.	• Increased tourist volumes create opportunities for livelihoods. • Business opportunities e.g. in terms of biotechnology, tourism and fishing as well as mining. • Small entrepreneurs have opportunities for success.	• Northern regions stay inhabited and the village communities viable. • People have more opportunities to choose where they want to live since remote working is flexible. • Increased self-sufficiency and local and small production have a positive effect on people's well-being. • Blue growth creates jobs and well-being.

Impacts of scenario 2 identified in the workshops for Northern Sea of Bothnia, the Kvarken and the Bay of Bothnia region.

Scenario

3

Baltic Sea of restrictions and tensions

MARITIME AREA FUTURE TABLE

DEVELOPMENT OF MARITIME LOGISTICS	SECURITY SITUATION	TOURISM AND RECREATIONAL USE	INTERNATIONAL TRADE	ENERGY SECTOR	ATTITUDES AND ENVIRONMENTAL ACTIONS	CONDITION OF THE MARITIME AREA	CLIMATE CHANGE IN THE BALTIC SEA	FISHING AND AQUACULTURE	URBANIZATION
Uncertain and centralised maritime logistics (strategic importance of fairways is emphasised)	**Baltic Sea of peace** (focal point of security politics is elsewhere)	**New tourists find the Baltic Sea archipelago** (increased popularity of nature tourism)	**Stronger cooperation within the EU** (EU sticks together in the midst of global protectionism)	**Energy unionformed byinfrastructure projects** (moderate increase of offshore wind power in restricted areas)	**Greener through regulation** (strong role of the EU and the state in protection)	**Baltic Sea weakens** (eutrophication and oxygen loss aggravate)	**Moderate change** (climate change has no significant effect on the weather)	**Sea as a breadbasket** (fish as environmentally friendly mass production, fish as replacement of meat)	**Biggest coastal cities keep their vitality** (ageing population moves to nearby cities)
The volume of maritime logistics increases at the companies' terms (logistics networks of the companies)	**Increased tension in the Baltic Sea area** (cooperation more difficult, hybrid influencing)	**Tourism in the Baltic Sea becomes more difficult** (less recreational use of the maritime area)	**International trade** (global markets in the Baltic Sea)	**End of combustion and electrification** (subsidised grid connection of offshore wind power, farms further out on the sea)	**Profitable and green** (new business under the terms of responsibility)	**The status stays poor** (blue-green algae blooms and nutrient load)	**Significant changes** (effects of climate change reflected on the Baltic Sea)	**Changing fish population and steady increase of aquaculture** (large units optimal, with profitable locations)	**Strong concentration on the metropolis,port cities die down** (big cities expand, immigration)
Reduced environmental effects of maritime logistics (circular economy, local production,small volume transport)	**Congested Baltic Sea** (new security policy situation, climate refugees)	**Tourism concentrates in the biggest cities around the Baltic Sea** (increased cruise tourism, interest in the culture)	**Ecological footprint steers consumption** (local production and consumption, new technological solutions)	**Moderate energy transition** (offshore wind power under the terms of companies, no subsidised grid connections, small farms near the shore)	**Ineffective environmental policy** (large-scale offshore wind power projects cannot be started)	**Improved condition of the maritime area** (successful reduction of load and recovery of the sea)	**Radical change** (heavy rainfall, floods, major seasonal variation)	**Flourishing leisure fishing and strict regulation of aquaculture** (return of Baltic herring as food, fish farming on the ground in closed water systems)	**Increased popularity of the archipelago** (transition of work life, living in many places, people seek access to pure nature)

Developments emphasised in scenario 3

National description

SOCIETY AND POLITICS

The power struggle between global superpowers has escalated into a trade war and geopolitical tensions also increase. The uncertain security situation reduces investments. There is friction between the western countries and Russia in particular. The restrictions to funding caused by sanctions also make it difficult to execute environmental cooperation projects in Russia. The likelihood of the military threat becoming realised is small, but the Finnish Defence Force still has strong interests with regard to the maritime area. Tight cooperation and increased integration between the EU countries stabilise Finland's situation, however. No global climate treaties have been reached, but EU still tries to lead by example and significantly tightens its environmental politics. EU's Water Framework Directive is interpreted more extensively from the perspective of sustainable development while also considering the perspectives of social and economic sustainability.

ENERGY

A joint energy union of the EU is created and energy self-sufficiency on the European level is emphasised. Security of supply and joint ambitious emission targets are emphasised in the harmonised energy market. The European Union subsidies renewable energy production forms, which in the Baltic Sea means direct subsidies to offshore wind power and the construction of wind power stations alongside the transmission cables. Coal is still, however, used in the production of energy to balance the variation of production in other countries. As the situation is tense, energy production is decentralised in order to minimise vulnerability.

MARITIME TRANSPORT

With the increased political tension, the Baltic Sea area more and more becomes a strategic playing field, and the strategic significance of logistics routes is emphasised. Maritime routes are possibly also used as a means of geopolitics and using in the Northern Sea Route becomes more difficult. Certain safe growth corridors are emphasised (such as Turku–Åland–Stockholm), and the ports of the west coast gain strength. Passenger traffic reduces substantially especially in the south. Recreational boating also becomes more difficult due to repeated cable projects especially in the Gulf of Finland and the Archipelago Sea. Prevailing cyber threats and distrust between national operations slow down the development of autonomous maritime transport.

CITIES AND POPULATION

Mobility increases within the EU and Europe continues to urbanize as the ageing population moves to nearby cities. People pack into cities also in Finland, and the biggest coastal cities keep their vitality. Ageing people in particular move to coastal cities due to the declining infrastructure of the archipelago. Vital operations of the society are faced with more and more cyber threats as a part of hybrid influencing.

THE ENVIRONMENT AND CONDITION OF THE MARITIME AREA

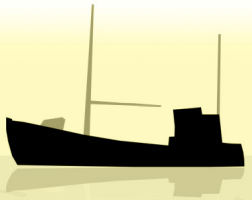
As the tensions grow, also maritime areas are reserved increasingly for defence use. Environmental cooperation with Russia is challenging and interaction is reduced, which has a negative impact on the state of the maritime environment. EU takes on a strong role in climate action. Attempts are made to stop eutrophication by means of regulation, decelerating the weakening of the state of the marine environment. Microplastics are banned in the EU, but this does not solve the problem as there are no global treaties on the matter. Signs of climate change can be observed in the weather conditions, but the Baltic Sea is still a favourable environment for many sources of livelihood.

FISHING AND AQUACULTURE

As EU's environmental politics become tighter, the taxation of meat is increased and a fish and vegetable-based diet becomes significantly more common. Meat is a luxury product, whereas aquacultured fish is everyday food. The interests of the Finnish Defence Force impede trawling in the open sea and fishing focuses on the coast. EU's agricultural policy relies on more productive areas and aquaculture in the Baltic Sea is subsidised. Efforts to reach self-sufficiency in the production of protein and the improved state of water due to stricter regulation increase aquaculture and production becomes multifold, focusing on the Bay of Bothnia and the Archipelago Sea in particular. The use of domestic fish and the utilisation of side streams generated by it as well as processing (e.g., bio-oil) increase significantly. Various blue bioeconomy innovations also increase the demand for raw materials from the Baltic Sea (such as cosmetics and the medicine).

TOURISM AND RECREATIONAL USE

The citizens' feeling of security suffers from the increased tension and information influencing. Tourism becomes more difficult, and hardly any tourists visit the Baltic Sea anymore. Cruises to Russia also decrease. The political tensions (such as flyover bans) are a part of the reason, but also personal travel emission budgets reduce tourism. Local recreation becomes a trend and tourism is the luxury of few wealthy people (a seascape becomes a privilege). Many cultural heritage sites are held by the Finnish Defence Force. There is increased pressure of use in popular tourism and recreation destinations such as the Suomenlinna sea fortress. Instead of the Gulf of Finland, tourism potential focuses on the safe and peaceful Bay of Bothnia (incl. branding of silence and darkness).



DESCRIPTION OF THE PLOT

2019-2025

Increased geopolitical tensions and more difficult cooperation with Russia

- The **trade war between USA, China and Russia escalates**, import duties are elevated and deliveries denied. Geopolitical tensions increase, slowing down the economic development in Europe as well.
- **Stronger confrontations.** The western countries bring out the unfair competition in China, for example, and areas increasingly need to choose the political camp with which they identify themselves.
- **Resource protectionism** increases, adding to the uncertainty of the availability of energy and minerals.
- As the foreign policy tensions increase, **EU's internal cooperation** grows tighter in order to ensure the security of supply in the region, and integration between EU countries increases.
- **Cooperation with Russia in terms of the Baltic Sea** also becomes more difficult when the security environment weakens (incl. the implementation of environmental cooperation projects).
- **A fatal extreme weather phenomenon** puts pressure on climate policy actions in Europe, and **EU substantially tightens its environmental politics**. Microplastics are banned in the EU, for example.
- As EU's environmental politics become tighter, the **taxation of meat is increased** and a fish and vegetable-based diet becomes significantly more common. **The Water Framework Directive** is interpreted more extensively from the perspective of sustainable development while also considering the perspectives of social and economic sustainability.
- Investors seeking sustainable targets **invest heavily on aquaculture** and large facilities are built in increasing numbers in the open sea, especially in the Gulf of Bothnia.
- The citizens' **feeling of security suffers** from the increased tension and information influencing. Regional tourism and recreation becomes a trend.

2025-2035

Promotion of self-sufficiency and security of supply drives the development of the EU

- The geopolitical hybrid influencing between superpowers increases and **military tensions increase also in the Baltic Sea**. As the tensions grow, also maritime areas are reserved increasingly for defence use.
- The Baltic Sea area more and more becomes a strategic playing field, and the **strategic significance of logistics routes** is emphasised. Safe growth corridors are emphasised (such as Turku–Åland–Stockholm), and the ports of the west coast gain strength.
- Due to the crisis of the foreign policy, energy self-sufficiency on the European level is emphasised even more and a **joint energy union** of the EU is created. Energy security is increased with strong control towards low-carbon economy.
- **New energy infrastructure** is built in the Baltic Sea (marine cables). Offshore wind power is supported and transmission cabling is constructed to offshore wind farms.
- EU's increasing environmental regulation focuses on the **meeting of climate goals**, and the diversity and good condition of marine nature receives less attention.
- **Load to the waters becomes a part of food policy control** from the perspective of the total load caused by food production. In addition to tax control, **load quotas** are distributed/bought between agriculture and fishery within catchment areas.
- Fishing opportunities decrease in the Gulf of Finland especially and import of fish to Russia decreases.
- **Fish farming in the open sea increases** globally as production methods and the competitiveness of production improve. Efforts to reach self-sufficiency in the production of protein, the longer growing season and the improved state of water due to stricter regulation increase aquaculture and **production becomes multifold**.

2035-2050

Ambitions of self-sufficient food production increase the growth of blue biotechnology

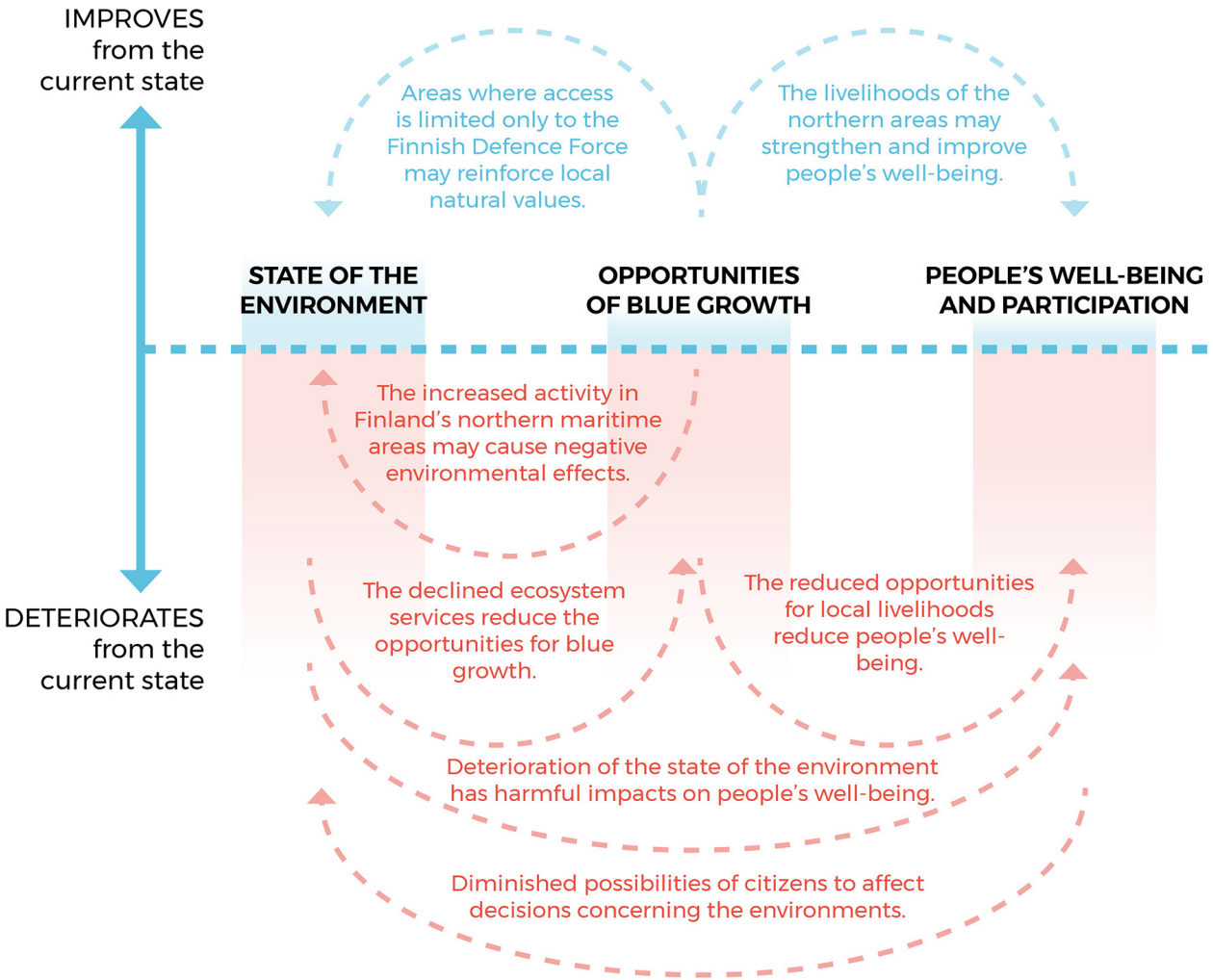
- **EU focuses on strengthening the internal market** and hybrid defence in the politically and economically uncertain global situation. **Floating weapons depots** gain popularity in international maritime areas.
- **Europe continues to urbanize** as the ageing population moves to nearby cities. People pack into cities also in Finland, and the biggest coastal cities keep their vitality.
- EU and Scandinavia aim more and more at **self-sufficiency in terms of energy and food production.**
- **Carbon neutrality**, i.e., the balance between carbon dioxide emissions and carbon sinks, is achieved **by 2050** by many Baltic Sea countries thanks to active climate policy.
- **As the water temperature increases** due to climate change, the Baltic Sea stays unfrozen almost the entire winter, which increases fish farming on the sea.
- **The use of domestic fish and the utilisation of side streams generated by it** as well as processing (e.g., bio-oil) increase significantly. Various blue bioeconomy innovations also increase the demand for raw materials from the Baltic Sea (such as cosmetics and the medicine).
- Increased rainfall, poor environmental cooperation and structural loads **continue to eutrophicate the Baltic Sea**. More and more plastic trash, chemical residues and environmental toxins accumulate in the sea. The diversity of flora and fauna is reduced.
- **Tourism decreases** and focuses on the safe and peaceful Bay of Bothnia. Tourism becomes the luxury of few wealthy people and **a seascape becomes a privilege**. Many cultural heritage sites are held by the Finnish Defence Force.

Impacts on MSP's objectives

BLUE GROWTH
- The general uncertainty and fear of conflicts weaken the economic growth and reduce investments and jobs.
- The biggest cities on the coast are doing fine, while the smaller ones are withering away.
- Operations and transport increase in the northern maritime areas as the highest tensions are focused on the Gulf of Finland. This may bring opportunities for livelihood and create synergies in the northern areas, but also lead to conflicts.
- The Finnish Defence Force expand their operations to cover even larger maritime areas and islands. This restricts the construction of wind power. Areas with limited access also restrict tourism and recreation.
- Ensuring the security of supply is emphasised in energy production. EU's energy politics may allow a better overall security of supply in the EU. Transmission cables shared with Sweden become possible and the need for domestic clean energy may also be emphasised.

STATE OF THE ENVIRONMENT
- The tense operating environment reduces environmental protection. Environmental risks and the risk of accidents increase. On the other hand, ecological values may become stronger in the areas of limited access.
- The increased activities in the northern maritime areas cause increasing negative impacts on the environment due to the dredging of new fairways, for example.
- The growth in logistics increases the risk of accidents at sea and causes more dredging of fairways and the related impacts. The increased extraction of sand from the sea may threaten diversity.

PEOPLE'S WELL-BEING AND PARTICIPATION
- The opportunities to participation decrease and democracy declines.
- The significance of local communities may grow.
- The restrictions of access decrease everyman's rights.



Indicative opportunities of scenario 3 identified based on the workshops with regard to the state of the environment, blue growth and people's well-being and participation.

Description of the area

ENERGY

EU's energy union and the opposition of the Finnish Defence Force to the construction of wind power cause a conflicting situation in the Gulf of Finland. This prevents any significant construction of wind power in the Gulf of Finland. The energy union brings cables to the seafloor, connecting various areas, and the Gulf of Finland is used as an energy transmission platform. Production is decentralised and storage is developed.

MARITIME TRANSPORT

The security environment moves focus to the maritime connections from the ports of Helsinki and Kotka to continental Europe and Sweden. Land and air transport increases at the expense of sea transport. The security environment also impacts the movement of people, decreasing passenger transport by sea significantly, which causes problems to the tourism industry. Few autonomous vessels are seen in the Gulf of Finland. Their test areas and operation are placed in other maritime areas.

STATE OF THE MARINE ENVIRONMENT

The state of the maritime area in the Gulf of Finland continues to decline. With the tensions, the role of the Finnish Defence Force increases in the Gulf of Finland, and the possible increase in defence force areas restricts the establishment of new nature conservation areas, among other things. The islands closed due to the defence forces retain their natural state. The increased number of seafloor cabling due to the energy union may have a harmful effect on the marine nature.

FISHING AND AQUACULTURE

The reduction of civil transport in the maritime area affects fishery and trawling. The small volume of fishing is evenly distributed on the coast of the Gulf of Finland except the Helsinki region. The tensions between the countries in the region reduce the export of fish to Russia, although foreign trade making up for this may be obtainable elsewhere, such as from China. Aquaculture grows multifold in front of Hanko and Helsinki, among others, which compensates the weakened possibilities for fishing.

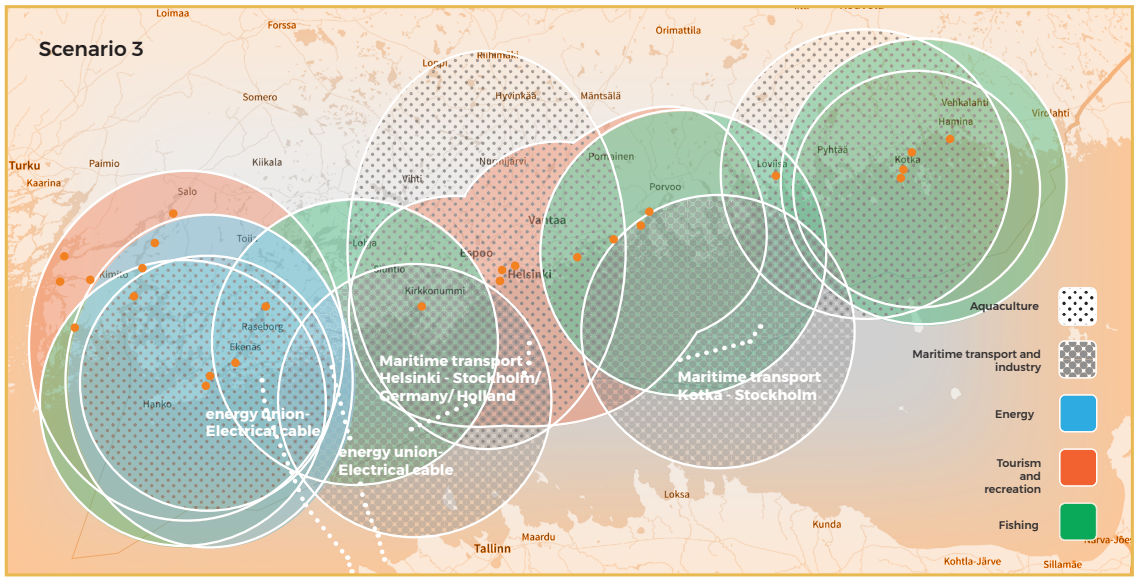


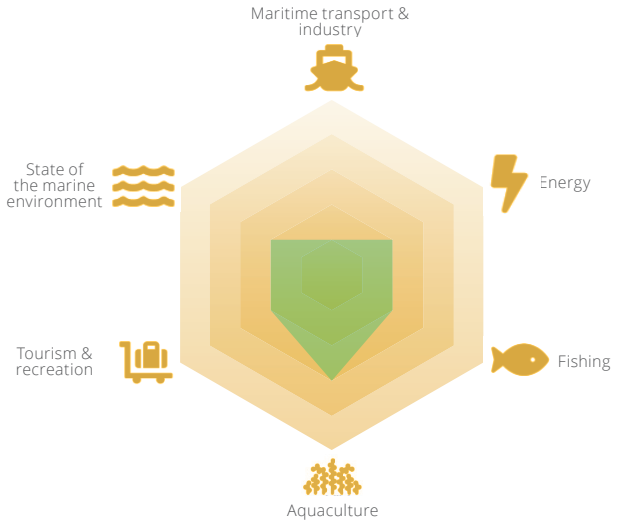
Illustration of scenario 3 on the map

TOURISM AND RECREATIONAL USE

Foreign tourist streams to the Gulf of Finland are reduced and the regional tourism and recreation trend is not fully adequate to make up for this, even though the migration gain of the area increases the local tourism and recreational use of the area by residents. Only Hanko and Helsinki are able to retain their favourable position amongst tourists. The weakening of the Russian connection has a highly negative impact on tourism in the Gulf of Finland, and cruise tourists from St. Petersburg no longer visit the ports of the Gulf of Finland. The possible expansion of Finnish Defence Force areas in front of Kotka and Porkkala hinders the recreational use of these areas. The seascape becomes a luxury product, and proximity to the shore is a subject of competition between several interested parties. The cabling projects which have increased with the energy union hinder recreational boating, which reduces the attraction of the maritime area for recreational use.

CULTURAL HERITAGE

Cultural heritage is overridden by security issues. Shipwrecks and building stock are destroyed to make way for security devices. The use of maritime areas is restricted significantly, and the seascape becomes a privilege of select few people. The disappearance of cultural heritage and landscape is significant in the Gulf of Finland compared to Finland's other maritime areas. Migration pressure in the Gulf of Finland increases the need to preserve cultural heritage and its values.



Impacts of scenario 3

	SECTORS				MSP'S OBJECTIVES		
IMPACTS	**Energy**	**Fishing and aquaculture**	**Tourism, recreation and cultural heritage**	**Maritime transport andindustry**	**Good condition of the sea**	**Blue growth**	**People's well-being and participation**
RISKS	• Increased maritime traffic makes increasing wind power difficult in the Gulf of Finland. • Conflicts between wind power projects and defence. • Energy production (offshore wind power) moves away from the biggest areas of consumption just like nuclear power (Helsinki metropolitan area).	• Fishing culture, competence and small-scale coastal fishing diminish.	• The deterioration of the environment reduces the attraction of tourism. • Increased tourism wears down the nature and cultural environments. • Cruise tourism does not generate income for local operators. • Centralisation of tourism creates a "Lapland" on the Gulf of Finland, which decreases the versatility and local nature of the tourism trade.	• Increased accident risks (in front of Kotka, for instance). • Impact of the development of the Northern Sea Route for the Gulf of Finland. • Emissions of the mining industry pose a risk to the environment. • The tunnel to Tallinn may make it more difficult to operate the harbours in the region. • Privatisation of infrastructure and harbours poses a risk.	• The exploitation of natural resources is powerful and short-sighted, which leads to a disruption of the ecological status and a reduction of water quality. • The centralisation of operations increases the pressure on the environment in the focal areas (esp. Helsinki and Kotka regions). • Risk of oil accidents increases in front of Kotka, for instance. • Release of sedimented harmful substances being released into the sea poses a risk.	• Increased activities and reduced regulation result in conflicts between sectors. • The tunnel to Tallinn may weaken the harbours in the region and increase competition in the Gulf of Finland. • Financial benefits escape from the region.	• Diminished participation opportunities (foreign decision-making and lack of local knowledge). • Polarisation of the region and degradation of services at the margins of the region. • Reduced living satisfaction and attraction. • Cultural impoverishment.
OPPORTUNITIES	• Big capital makes it possible to build in the exclusive economic zone. Possibility to include expensive radar compensations.	• Increased self-sufficiency and opportunities for success for specialised companies. Blue economy innovations.	• Well-maintained, attractive cultural centres: Kotka-Hamina, Porvoo and Hanko, counterbalancing the big cities of the Baltic Sea.	• Well-maintained, attractive cultural centres: Kotka-Hamina, Porvoo and Hanko, counterbalancing the big cities of the Baltic Sea.	• With the centralisation of activities, the reduced use of the margin areas may lead to an improvement of the environment. • Improved raw material efficiency. • Globalisation of environmental activism creates pressure for sustainable operating methods.	• Centralisation of activities strengthens businesses especially in the Helsinki and Kotka regions. The small towns of the Gulf of Finland benefit from increased cruise tourism. • New commercial forms of use for blue-green algae. • Lease and sales income for water body owners.	• New jobs especially e.g. in the Kotka region in addition to the capital area. • Improved connections from Finland to Europe.

Impacts of scenario 3 identified in the workshops for the Gulf of Finland region.

DESCRIPTION OF THE AREA

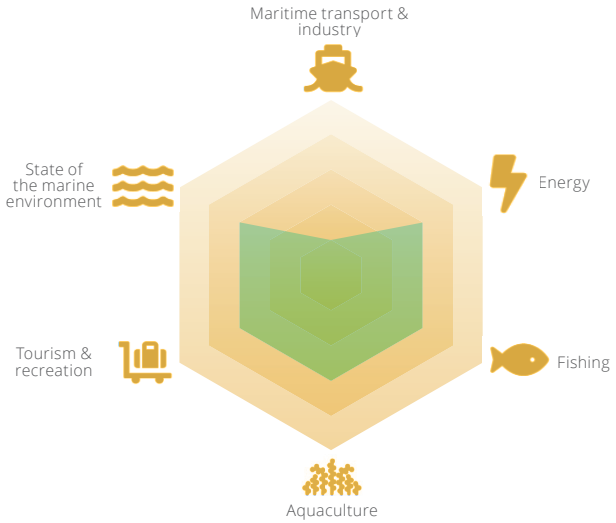
ENERGY
Energy production areas are primarily selected based on the security of supply, which may lead to the decentralisation of energy production. Åland has energy production as a demilitarised zone to support its self-sufficiency. Offshore wind power becomes more common in the southern Sea of Bothnia. The energy union increases cable connections from the west coast to the direction of Sweden.

MARITIME TRANSPORT AND INDUSTRY
The ports on the west coast become stronger due to the security environment and the focus of maritime transport moves partly away from the congested Gulf of Finland. Cooperation with Sweden is increased, which is reflected in increased ship traffic, among other things. The threat of cyber influencing makes maritime transport more difficult and the role of maritime surveillance is emphasised. Transport volumes increase and ports are expanded. Cities of the area develop and the significance of ports in the area is emphasised. The fleet is developed and maintained. The strong maritime logistics competence in the area opens up new opportunities for maritime industry and logistics.

STATE OF THE MARINE ENVIRONMENT
The state of the maritime environment is a continuum of the current state. Cattle production in Finland Proper decreases, but field cultivation areas do not decrease because the pressure to produce nutrition remains unchanged or increases, partly due to reasons related to the security of supply. The Sea of Bothnia is a "forgotten area", and as a result, the state of the marine environment is the best there. The presence of the Finnish Defence Force improves the condition of nature in the defence areas due to the restricted use. Aquaculture increases, which causes a threat to the state of the marine environment in the area.

FISHING AND AQUACULTURE
Fish caught by fishing is a luxury product and recreational fishing gains popularity. The biggest coastal cities of the area offer fishing tourism on fishing boats in the nearby waters. Due to the deteriorated condition of the sea, new species find their way to the area, including the air-breathing catfish. Aquacultured fish becomes everyday food as the consumption of meat decreases. Load to the waters has become a part of food policy control from the perspective of the total load caused by food production and production facilities concentrate on the southern parts of the Sea of Bothnia in particular as the production of pork and chicken has died down. In addition to tax control, load quotas are distributed/bought between agriculture and fishery within catchment areas. The nutrient load quotas are set on a sustainable level. Fur farming has been prohibited due to stricter regulation. Major changes in the utilisation of the Baltic herring catch are needed as a result. The transition is subsidised by the state.

TOURISM AND RECREATIONAL USE (incl. cultural heritage)
Destinations near the cities (such as Ruissalo, Yyteri) are important for tourism, and the significance of coastal archipelago increases in the area. People seek some luxury and an escape from the daily life from the nature and the proximity of the sea. Tourism destinations in the archipelago are decreasing in number, however, and the remaining local recreational areas are pressed hard due to tourism overload. Permanent residents leave the archipelago, which also weakens the services of the area from the perspective of tourism. Cultural history destinations of the coastal archipelago and the Sea of Bothnia still attract people and gain in popularity in the changing world. The poor condition of the maritime environment reduces nature tourism and private boating, among other things. The Sea of Bothnia becomes more attractive (cleanliness and safety).



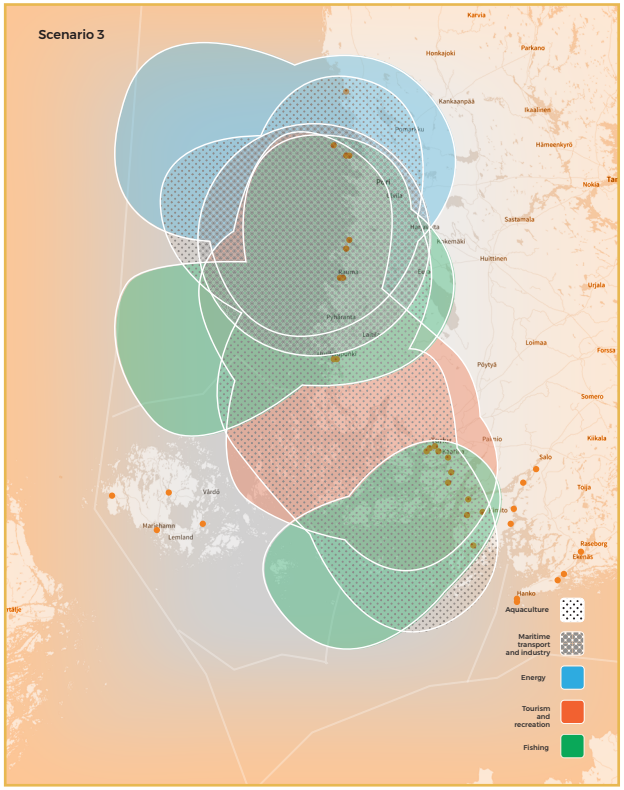


Illustration of scenario 3 on the map

Impacts of scenario 3

	SECTORS				MSP'S OBJECTIVES		
IMPACTS	**Energy**	**Fishing and aquaculture**	**Tourism, recreation and cultural heritage**	**Maritime transport andindustry**	**Good condition of the sea**	**Blue growth**	**People's well-being and participation**
RISKS	• Western cooperation with Sweden may not be realised due to the risks seen in the region. • Operations of the Finnish Defence Force impact the placement of energy production; the focal point of production will be in the Sea of Bothnia north of Åland.	• The poor state of the maritime environment reduces the possibilities for aquaculture. • Farming of salmon may become more difficult due to the warming of water as a result of climate change. • Reduced willingness to invest.	• Closed areas reduce the opportunities for tourism and recreation in the Archipelago Sea.	• Closed areas restrict business operations and other activities. • The accident risks of uncontrolled maritime transport increase.	• The state'sregulation of the environment may lessen in a tense situation, which decreases the state of the environment. • Increased accident risks. • Releases to the environmentresulting froma conflict pose a risk. • Denser activity along the coast increases the burden on the environment.	• Reduced tourism and deterioration of everyman's rights due to restrictions. • Low development of wind power due to the uncertain investment environment. • The development of an EU energy union may not be possible in the tense situation of the Baltic Sea.	• Increased inequality and the tense situation decrease people's freedom and well-being. • Strong regulation may increase opposition and extreme thinking. • Reduced opportunities for recreation reduce people's well-being.
OPPORTUNITIES	• Sweden wants to integrate Finland even more closely into the West. Joint cables are developed with Sweden in front of Pori.	• The total budgeting of nutrients evens out • the nutrient load. • Using Baltic herring as forage, increased export opportunities. • Increased significance of fishing for domestic use	• Emphasised role of regions near the cities in recreational use and tourism (Turku-Ruissalo, Pori-Yyteri). • The Sea of Bothnia region is quite safe – this attracts tourists.	• Infrastructure also develops in line with armament. • The harbours benefit from the situation. • Increased willingness of global companies to invest in the region at the expense of the Gulf of Finland.	• Natural values get stronger in the areas closed from public. • Increased interest in business operations may also improve the opportunities to preserve natural values.	• Increased domestic production, self-sufficiency and security of supply. • Possibility to develop the transfer network (e.g. cable to Sweden). • Technological growth improves the possibilities for aquaculture. Growth of aquaculture supports blue growth.	• Increased sense of community. • Increased viability of the coastal cities.

Impacts of scenario 3 identified in the workshops for the Archipelago Sea and southern Sea of Bothnia.

DESCRIPTION OF THE AREA

ENERGY

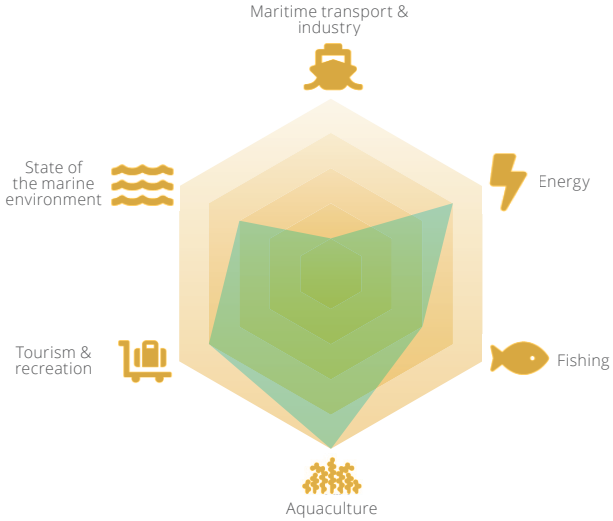
The tense and conflicting Baltic Sea pushes energy production from the Gulf of Finland to the Gulf of Bothnia. The security of supply perspective brings out the versality of energy production, and a decentralised production structure is emphasised (decentralised, versatile and partly small-scale production is also emphasised on the mainland). Offshore wind farms are constructed also in the northern area (e.g., Oulu, Raahe, Pietarsaari and Kaskinen latitudes) while considering the interests of the Finnish Defence Force. The radar compensation area of the Bay of Bothnia has been expanded. International electricity transmission connections are also developed from the perspective of safety and security of supply, and cables are laid in the northern area as well. The safety of the Bay of Bothnia is emphasised, but the interests of the Finnish Defence Force are also reflected on the Bay of Bothnia (safeguarding infrastructure critical to the security of supply, such as nuclear power stations).

MARITIME LOGISTICS

The ports of the area are safe and viable compared to the southern conflict ports and the aim is to keep them in Finnish ownership. The sea routes in the area are relatively safe and functional. Internal traffic in the area grows and ship traffic in the west–east direction and in the direction of the coast increases. The traffic difficulties of the Northern Sea Route also create opportunities for marine traffic in the area. On the other hand, the significance of the northern dimension is emphasised as traffic in the Baltic Sea is restricted.

STATE OF THE MARINE ENVIRONMENT

Noise in the maritime area increases with the emphasis on northern ports. The intention is to safeguard the production of critical minerals found in the northern maritime area, which also affects the state of the marine environment. Hydraulic engineering increases in the Finnish Defence Force practice area, port areas and near electricity transmission cables, which has a negative effect on the state of the marine environment.



FISHING AND AQUACULTURE

Coastal fishing is exercised in the Kvarken area especially around Vaasa and also in the northern part of the Bay of Bothnia to some degree. Trawling decreases as the interests of the Finnish Defence Force increase. Aquaculture increases substantially in the area, focusing in front of Kaskinen, Vaasa, Kalajoki, Oulu and Kemi in particular. The abundant increase in aquaculture also increases the need for forage fishing.

TOURISM AND RECREATIONAL USE

The arctic sea is a sweet spot of tourism, but stricter regulation negatively affects the pricing of flights, among other things, and thereby the foreign tourist volumes. The growth of tourism relies on increased domestic travel and attracting Swedish and Norwegian tourists to take a tour of the Bay of Bothnia. Cruise travel in the Bay of Bothnia invites people as a safe cruise route. The significance of nationally important shooting and practice areas is emphasised in the tense situation (such as Vattajanniemi in Kokkola's Lohtaja).

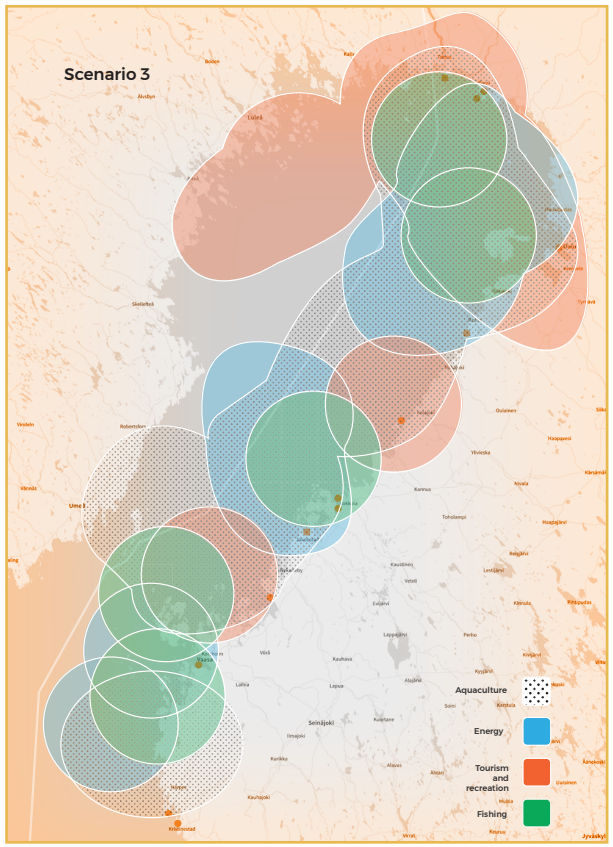


Illustration of scenario 3 on the map

CULTURAL HERITAGE

Some of the built heritage sites crumble away as a result of the reduced tourism. Environmental destinations, on the other hand, are doing better as tourism and thereby traffic volumes decrease.

MARITIME INDUSTRY AND MINERALS

The high demand for minerals increases investments on the mineral industry. The prices of metals increase and the profit margins of steel mills improve, which in its part raises investments on these. Sand is extracted from the sea in the Bay of Bothnia. The increased dredging and hydraulic engineering impact the state of the marine environment. Maintaining and improving the condition requires substantial monitoring and sanctions.

Impacts of scenario 3

	SECTORS				MSP'S OBJECTIVES		
IMPACTS	**Energy**	**Fishing and aquaculture**	**Tourism, recreation and cultural heritage**	**Maritime transport andindustry**	**Good condition of the sea**	**Blue growth**	**People's well-being and participation**
RISKS	• Transfer costs may be high if the population becomes centralised but production is decentralised. • Challenges caused by the coordination of defence interests and energy production.	• Insufficient feed poses a risk to fish farming.	• Income from tourism remains low, resources are reduced. • Other activities threaten the preservation of the cultural heritage.	• Access to northern regions becomes more difficult with the uncertainty of transport (e.g. is there access through the Denmark Strait?) • The Finnish Defence Force area in Vattaja may restrict other traffic. • A nuclear power station causes risks.	• The relatively calm operating environment and rather good condition of the Bay of Bothnia attract new kinds of operators whose risks may not necessarily be known. • Increased utilisation of sea sand causes harmful effects to the environment. • Increased population in the coastal citiescauses risks to the environment. • The growth in logistics increases the risk of accidents at sea and causes more dredging of fairways and the related impacts.	• Powerful growth in the demand for domestic fish threatens the sustainability of the fishing industry. • Conflicts between the new operators may arise in the northern maritime area. • Termination of Russian transition transport would be a hard blow for the Kokkola harbour. • International trade in the region is challenging and the economic situation gets poorer.	• The reduction of investments decreases employment. • Democracy declines and the opportunities to participation decrease. • Reduced opportunities for recreation due to the closed areas.
OPPORTUNITIES	• Achieving a better overall certainty of supply in the EU is possible. • As a result of EU's energy policy, subsidising synergies and new forms of energy is possible.	• New opportunities arise in fish farming. • The value of fish increases. • Using Baltic herring as a foodstuff increases.	• Development of small-scale tourism activities is possible. • Closed areas may protect the cultural heritage. • The tour of the Bay of Bothnia is developed into a tourism destination. • Development of opportunities for tourism and recreation supports the population and the preservation of infrastructure in the coastal region.	• With the biggest tensions concerning the Gulf of Finland and southern Baltic Sea, the safer northern maritime areas attract investments.	• Local, clean energy production increases. • Natural values get stronger in the areas used by the Finnish Defence Force.	• Interests of several new operators on the sea may allow synergies. • Increased maritime tourism becomes possible thanks to the safe operating environment in the north. • Shipping and harbour operations focus on the Gulf of Bothnia due to safety reasons.	• The northern area is safer than the rest of Finland, which is reflected in well-being. • Sense of community and social networks grow stronger. • Increase in domestic production brings more opportunities.

Impacts of scenario 3 identified in the workshops for Northern Sea of Bothnia, the Kvarken and the Bay of Bothnia region.

Compiled
scenarios

Maritime area future table

Alternative developments of central uncertainties

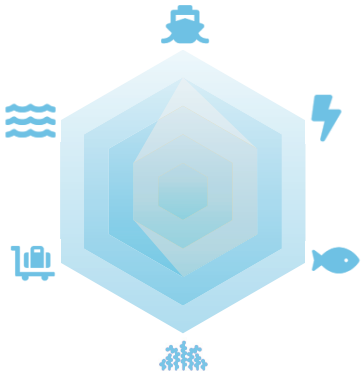
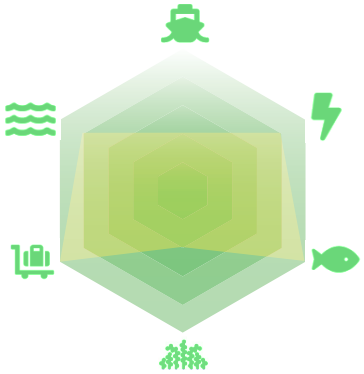
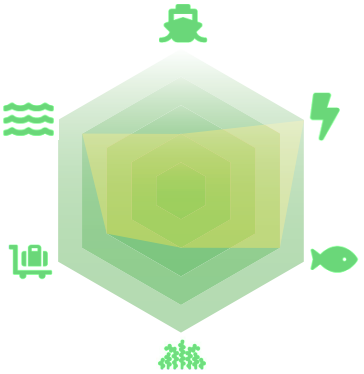
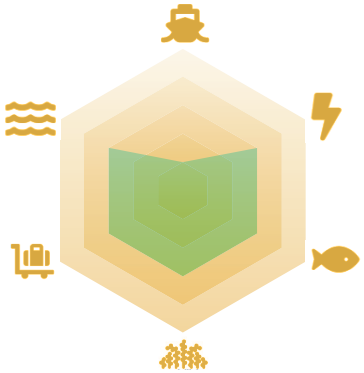
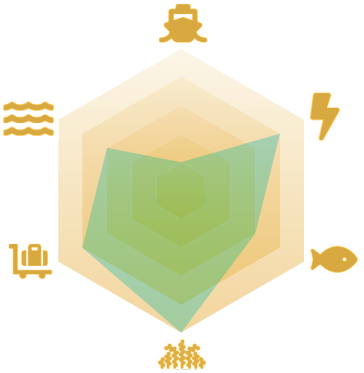
DEVELOPMENT OF MARITIME LOGISTICS	SECURITY SITUATION	TOURISM AND RECREATIONAL USE	INTERNATIONAL TRADE	ENERGY SECTOR	ATTITUDES AND ENVIRONMENTAL ACTIONS	CONDITION OF THE MARITIME AREA	CLIMATE CHANGE IN THE BALTIC SEA	FISHING AND AQUACULTURE	URBANIZATION
The volume of maritime logistics increases at the companies' terms (logistics networks of the companies)	**Congested Baltic Sea** (new security policy situation, climate refugees)	**Tourism concentrates in the biggest cities around the Baltic Sea** (increased cruise tourism, interest in the culture)	**International trade** (global markets in the Baltic Sea)	**Moderate energy transition** (offshore wind power under the terms of companies, no subsidised grid connections, small farms near the shore)	**Ineffective environmental policy** (large-scale offshore wind power projects cannot be started)	**Baltic Sea weakens** (eutrophication and oxygen loss aggravate)	**Radical change** (heavy rainfall, floods, major seasonal variation)	**Changing fish population and steady increase of aquaculture** (large units optimal, with profitable locations)	**Strong concentration on the metropolis,port cities die down** (big cities expand, immigration)
Reduced environmental effects of maritime logistics (circular economy, local production,small volume transport)	**Baltic Sea of peace** (focal point of security politics is elsewhere)	**New tourists find the Baltic Sea archipelago** (increased popularity of nature tourism)	**Ecological footprint steers consumption** (local production and consumption, new technological solutions)	**End of combustion and electrification** (subsidised grid connection of offshore wind power, farms further out on the sea)	**Profitable and green** (new business under the terms of responsibility)	**Improved condition of the maritime area** (successful reduction of load and recovery of the sea)	**Moderate change** (climate change has no significant effect on the weather)	**Flourishing leisure fishing and strict regulation of aquaculture** (return of Baltic herring as food, fish farming on the ground in closed water systems)	**Increased popularity of the archipelago** (transition of work life, living in many places, people seek access to pure nature)
Uncertain and centralised maritime logistics (strategic importance of fairways is emphasised)	**Increased tension in the Baltic Sea area** (cooperation more difficult, hybrid influencing)	**Tourism in the Baltic Sea becomes more difficult** (less recreational use of the maritime area)	**Stronger cooperation within the EU** (EU sticks together in the midst of global protectionism)	**Energy unionformed byinfrastructure projects** (moderate increase of offshore wind power in restricted areas)	**Greener through regulation** (strong role of the EU and the state in protection)	**The status stays poor** (blue-green algae blooms and nutrient load)	**Significant changes** (effects of climate change reflected on the Baltic Sea)	**Sea as a breadbasket** (fish as environmentally friendly mass production, fish as replacement of meat)	**Biggest coastal cities keep their vitality** (ageing population moves to nearby cities)

Developments emphasised in scenario 1

Developments emphasised in scenario 2

Developments emphasised in scenario 3

Illustration of scenarios

	Gulf of Finland	*Archipelago Sea and Southern part of Bothnia Sea*	*Northern Bothnia Sea, Quark and Bothnia Bay*
Scenario 1			
Scenario 2			
Scenario 3