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## Potential for sustainable blue economies

### 1.1.2 Report on existing strategies of key maritime sectors and their future development trends

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## ABSTRACT

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### **Abstract:**

The Blue economy concept and the Blue Growth agenda as a set of strategic objectives, offer principles and guidance to identify blue economy potential for the cross-border Maritime Spatial Planning (MSP) processes. Coastal regions and areas are recognised as having economic growth potential that exceeds the levels of inland regions, which indicates that the sea basin withholds valuable strategic resources in aiming for sustainable growth in the Plan4Blue (P4B) project area in Finland and Estonia. The P4B output report 1.1.1 presents the past and current economic developments of the selected blue industries in the project region. This report builds on the current state analysis to outline and summarise some key strategic visions, aims and objectives for the future, communicated by a wide range of blue economy stakeholders in the Baltic Sea Region (BSR) and globally, that is the EU, OECD, UN and focal blue industries that have all published visions and guidelines or strategic objectives and policy papers to pursue future growth in a sustainable manner. The strategies for the key blue industries call for cross-border and cross-sectoral development in the Baltic Sea region to achieve blue growth effectively. In order to maintain and improve the health of the Baltic Sea and wellbeing in the coastal areas requires strategic goal setting for short, medium and long-term. The blue economy industries are interconnected and interdependent, which should be seen as an advantage in the strategy formation and differentiation in the markets to achieve economic growth in the future. More research is needed for more deeply understanding sustainable blue economy dynamics and sectoral linkages within the wider regional economy.

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# 1. INTRODUCTION

## Background

"Blue growth" means a long-term strategy to support marine growth as a whole. According to the *European blue growth strategy* (COM 2012 a), the seas and oceans are important engines of the European economy and have considerable potential for innovation and growth. Blue growth promotes the implementation of the Europe 2020 strategy for smart, sustainable and inclusive growth within the framework of the EU Integrated Maritime Policy (Maritime Affairs, 2017). The European blue growth strategy aims at creating a match between blue industry needs and ecosystem services through utilizing appropriate policies (COM 2017). Although much strategic work has been carried out over the last decade in the EU and Baltic Sea Region (BSR) to support sustainable development and future Maritime Spatial Planning (MSP) processes, (e.g. in connection with Vision and Strategies Around the Baltic Sea (VASAB) and the Helsinki Commission (HELCOM)), closer regional analysis is needed to better understand national and cross-border blue growth potential in specific areas, such as the Plan4Blue project area. Identifying and understanding the past and future economic development of the regionally significant blue economy industries and stakeholders is vital for successful MSP processes that support regional blue growth initiatives and sectoral strategies in Finland and Estonia. According to the EU MSP Directive (2014), the planning needs to be a coherent process involving all relevant actors in the maritime sector. This requires effective networking and active involvement from the planners and economic actors including individual companies, representatives of industry sectors and regional interest groups. The stakeholders need to exchange future-related information for outlining joint visions and strategic steps that can be acknowledged in the MSP processes to support sustainable blue growth.

Currently, the blue industry sectors and global, European and national policy makers have all set their visions to embrace sustainable development and address economic, social and environmental objectives they want to pursue in the future. This report attempts to bring together some of those visions and strategies that set perspectives to the blue economy development in the Plan4Blue project area in Finland and Estonia. A noteworthy fact is that although the communicated sustainability aims have many overlapping and joint elements, e.g. the quest for energy efficiency, recycling and cleaner production, the individual industries all see themselves in the centre of development. Strategic decision-making and market differentiation may still require actions that support and benefit certain growth areas more than those areas with less (sustainability) potential in the future. For this, MSP planners and policy-makers need information that clarifies the current economic development and future trends of blue industries. Understanding the global and national policies and industry guidelines together with the local stakeholder involvement are likely to influence the success of MSP processes in supporting cross-border and cross-industry cooperation and sustainability. The blue economy industries are often characterised as being interdependent and interconnected. To recognise how the existing strategies affect BSR blue industry companies and coastal regions are positioned and which trends and drivers impact the future development of the industries is needed for decision-making that supports effective future MSP processes in the P4B project area.

## Blue growth in the BSR and the significance of coastal regions in Estonia and Finland

In the Plan4Blue project the focus industries include the following sectors: marine fishing and aquaculture; maritime transport; and marine construction; maritime tourism; and energy. These sectors are considered to represent those business sectors having most growth potential and significance for the Maritime Spatial Planning process. The flagship initiative of the Europe 2020 Strategy 'The Roadmap to a Resource Efficient Europe' (Roadmap 2011) recognizes that marine resources are a key component of our natural capital, and provide economic opportunities to a wide range of sectors such as minerals extraction, pharmaceuticals, biotechnology and energy. Pursuing these in a sustainable manner is essential for the marine environment to provide its key ecosystem services, such as the natural regulatory functions that help combat climate change or slow coastal erosion (EUBSR, 2017b).

Marine and maritime sectors create opportunities for sustainable growth, competitiveness and jobs. According to Eurostat (2011), the share of coastal regions in Finland is almost 60 % and in Estonia almost 65 % of the total share of the regions. The gross value added (GVA) of the coastal (NUTS 3) regions in Finland was over 67 % and in Estonia over 82 % of the national GVA in 2010. Additionally, the Gross Domestic Product (GDP) per capita in Finland's coastal regions was 11.3 % higher than that of the national average GDP per capita. The population mostly lives near the sea. In Finland almost 64% and in Estonia 74 % of people live in the coastal regions (COM, 2013). Further, the employment rate is higher in the coastal regions. In both countries, out of the Plan4Blue coastal regions the capital city regions have the highest population density. These special characteristics of the coastal regions clearly show the blue growth potential and wider economic importance of the industries and communities in the coastal regions.

### Blue sectors and the economic potential

In the EU context, the Europe 2020 Strategy's flagship initiative 'The Roadmap to a Resource Efficient Europe' (Roadmap 2011) states marine resources as a key component of our natural capital that provide economic opportunities in a wide range of sectors. Marine and maritime sectors create opportunities for sustainable growth, competitiveness and jobs. This requires climate change policies, a focus on resource efficiency, and research and innovation. The vision stated in the Roadmap to a resource-efficient Europe is the following:

*By 2050 the EU's economy has grown in a way that respects resource constraints and planetary boundaries, thus contributing to global economic transformation. Our economy is competitive, inclusive and provides a high standard of living with much lower environmental impacts. All resources are sustainably managed, from raw materials to energy, water, air, land and soil. Climate change milestones have been reached, while biodiversity and the ecosystem services it underpins have been protected, valued and substantially restored.*

In 2011, the *BaltSea Plan Vision 2030* (BaltSea Plan 2011) was formulated by the BaltSeaPlan partners. The vision identified key transnational topics for a sustainable development of the Baltic Sea requiring cross-border cooperation: healthy marine environment, coherent pan-Baltic energy policy, safe maritime transport and sustainable fisheries. Three interdependent visions were formulated: environmental, socio-cultural and economic visions. The key growth areas and development potential, such as the significance of tourism for the region, can be found in the BaltSeaPlan economic vision:

*The Baltic Sea generates high quality employment. Both green and blue technologies are pursued. Port locations benefit from new offshore uses and offer a wide range of industrial production facilities. The Baltic Sea is important for safe, efficient and environmentally friendly interregional transport and connects the entire region to the outside world; as such it makes an essential contribution to the region's competitiveness. Tourism based on a healthy Baltic Sea is a key sector of the economy, creating jobs and income along the entire Baltic Sea coast.*

The economic potential of the blue sectors can only be assessed in relation to their societal impacts and environmental impacts, and in relation and in comparison to those of the other blue sectors and also the non-blue sectors. The potential of the blue sector is impacted by the synergies and conflicts with other sectors in the regional economy. Blue growth potential is based not only on economic capital (finance and investments) but on social capital (expertise, cooperation, networks, trust, institutions) and environmental capital (sustainably managed ecosystem services).

## Methods

The data presented in this report will illustrate the potential and future development of the Blue Economy in the P4B project area and will provide information for the MSP process aiming at supporting sustainable growth. The blue industry sectors and global, European and national policy makers have all set their visions to embrace sustainable development and to address economic, social and environmental objectives they want to pursue. By mapping which public sector participants are involved in the Blue Economy and to what extent, this report attempts to bring together some of those sectoral visions and strategies that set perspectives to the blue economy development in the Plan4Blue project area in Finland and Estonia. In the following chapters, we illustrate a range of the EU level and national or regional strategies for the marine sectors in the BSR.

In this report, the illustration of industry strategies, policy guidelines and future development trends are primarily based on the synthesis of previous EU and BSR level studies, OECD and UN reports. We have also used Eurostat and national Finnish and Estonian statistical databases as sources in the analysis. The combination of a range of methods aims at providing useful and up-to-date information to support the future maritime spatial planning processes in the Plan4Blue project region.

## 2. MARINE FISHING AND AQUACULTURE

### EU-level strategies and policies

In 2013, a new and reformed *Common Fisheries Policy* (Regulation (EU) No 1380/2013) was agreed at the EU level and has been implemented since. The aim is to support the traditional European fisheries sector by making fishing sustainable and simultaneously, to improve the economic and social situation of fishermen. Community-Led Local Development (CLLD) has been implemented under the European Maritime and Fisheries Fund since 2014. Fishing tourism development is one example of helping fishermen to diversify their activities and reduce the pressure on stocks. Another area is the promotion of the local catches in restaurants and hotels. (COM, 2017.)

The fishing sector is a well-established and mature industry in the BSR and P4B project area. In the future, fishing continues to be a key blue industry sector but greater growth potential lies in the

development of aquaculture solutions and services. Related to these two sectors, blue biotechnology is widely established and used as an enabling technology for thriving food and feed, pharma, cosmetics and other industries. Blue biotechnology plays a role as an enabler through the whole value chain, also having positive effects on the neighbouring development fields of blue biomass production and sustainable fish aquaculture. (ECORYS & S.Pro, 2017) The European Commission's *Strategy and Action Plan on bioeconomy* (COM 2012) builds on a circular thinking and links sustainable bioeconomy to all parts of the green and blue economy. It recognises a future challenge and a need to explore how to transform the increased demand of biomass and bio-based products into sustainable solutions in the entire value chain from biomass to food, innovative bio-based products and bioenergy. (COM, 2012)

Aquaculture is farming of fish, crustaceans, molluscs, aquatic plants, algae, and other aquatic organisms. From a legal perspective, it is the cultivation of aquatic organisms by some techniques, where the organisms remain the property of a natural or legal person throughout the process (EU Regulation 2013 on Common Fisheries Policy, Article 4(1)(25)). For producing animal protein, nutrition efficiency is typically better in aquaculture than with many animals farmed on land (MMM 2014, 2). In 2015, the global production of fish farming exceeded that of beef for the first time (LUKE). The Food and Agriculture Organization of the United Nations (FAO 2010) estimates that aquaculture will produce 65% of global fish consumption by 2030. Prevention of food losses and reducing waste are important for resource efficiency and food security (HLPE 2014). FAO (2010) emphasizes the need to focus on the policy and governance of aquaculture, especially in relation to employment and poverty alleviation.

In the EU blue growth strategy (COM 2012), aquaculture has been recognized as one of the five most potential blue growth areas (along with maritime and coastal tourism, marine energy, marine mineral resources and blue biotech). EU regulation 1380/2013 on the Common Fisheries Policy states that European aquaculture should contribute to meeting the growing world demand for aquatic food and provide growth and jobs for EU citizens (preamble 53). The goal is that "fishing and aquaculture activities are environmentally sustainable in the long-term ... with the objectives of achieving economic, social and employment benefits..." (EU2013a, Article 2(1)). According to *the EU Commission's strategic guidelines for sustainable aquaculture* (2013b), the goal is to grow significantly. Of the EU consumption of fishery and aquaculture products (13.2 million tonnes), 25% comes from EU fisheries, 10% from the EU aquaculture, and 65% from imports. EU aims to fill the gap at least partly by "*environmentally, socially and economically sustainable EU aquaculture*". One percent of EU consumption means around 3000 to 4000 jobs if produced by EU aquaculture. (EU 2013b, 2). Business diversification may provide additional sources of income: fish farming may, for example, be integrated with angling and tourism (EU 2013b, 7).

According to European Commission's Blue Growth Strategy report (COM 2017), the vision for 2030 of the blue bioeconomy is the following:

- Clear regulatory framework in place
- Bio-based products & services available
- Mussel farms for environmental services
- BSR is a global knowledge hub of biorefinery and circular economy
- Wild biomass for biogas, feed or food ingredient
- Commercial macroalgae cultivation
- Blue biotechnology upscaling
- Positive consumer attitudes

## National/regional strategies for Finland

*The Finnish aquaculture strategy* (MMM 2014) states that the development and competitiveness of Finnish aquaculture is determined by legislation, demand, and worldwide market situation (MMM 2014, 2). Aquaculture may have a large impact on local economy in distant regions (MMM 2014, 5). The Finns eat 80 000 tonnes of fish a year, of which Norwegian salmon accounts for half and one third is Finnish (MMM 2014, 4). Salmon is the most common farmed fish in Finland with a 90 % share, and whitefish is the second most popular. Finnish aquaculture targets to growing from current 13 000 tonnes to a yearly production level of 20 000 tonnes by 2022 (MMM 2014, 7). Circular economy is seen as R&D –based innovative activity (MMM 2014, 6) and organic and environmentally certified production is listed as a possible production strategy (MMM 2014, 10). For setting up an aquaculture facility, the farmer must apply for an environmental permit according to the Environmental Protection Law, and structures on water need a building permit according to the Water Law.

## National/regional strategies for Estonia

In Estonia, the number of professional fishermen has decreased over the years. There were approximately 2420 professional fishermen in Estonia in 2016, including 1670 coastal fishermen, 497 inland water fishermen, 189 fishermen working on trawlers and 80 in the long-haul fisheries. As of 2016, there were 36 vessels in the Baltic Sea and 5 fishing vessels in the Atlantic Ocean in the Estonian fishing fleet and, according to data provided by the Fisheries Information System, there were a total of 1508 coastal fishing boats and 484 inland fishing boats. (Fisheries Information Centre.)

*The Estonian Fisheries Strategy (EFS) for 2014–2020* includes Estonia's state of fish stocks, coastal fishery, trawling, recreational fishing, distance fishing, processing, marketing, as well as research and development activities. Its main objective is the sustainable development of Estonian fisheries industry as a branch of economy and enhancing the competitiveness of the fish production in the domestic and foreign markets. The document provides for focusing more on increasing knowledge and innovation to use the existing technical base as effectively and cost-efficiently as possible. To achieve the objectives set out in the strategy, the sustainability of fish stocks must be ensured through the optimum use of fishery resources. Commercial fishing in conjunction with recreational fishing should not exceed the fishing capacity established.

The strategy serves as a basis for *the European Maritime and Fisheries Fund (EMFF) operational programme*, which determines the proposed measures for the development of the fisheries sector. The goal of developing the trawling sector for the years 2014-2020 is to shape Estonia as an important Baltic herring and sprat logistics center for the Baltic Sea region. The objective of developing recreational fisheries in the years 2014-2020 is to promote, develop and diversify recreational fishing and fish tourism and related economic sectors, also development of relevant infrastructure. The objective of developing coastal fisheries (up to 12 nautical miles or 20 m depth) and inland fisheries in 2014-2020 is to increase the economic sustainability. The priority will be given to supporting the development of ports, sustainable and innovative solutions for processing and fishing (selectivity), opportunities for direct and joint marketing, diversification of activities and promotion of cooperation. (Ministry of Rural Affairs, website; Põllumajandusministeerium, 2013)

Estonia has developed *an aquaculture strategy for 2014-2020* (Tallinna Ülikool, Eesti Maaülikool, 2013). Estonia has set targets to grow aquaculture significantly. While the current (2016) production is 868 tonnes (including 680 tonnes (78%) rainbow trout) (Statistics Estonia, 2017), production capacity was 2000 tonnes in 2014 due to recent investments, and expected to rise to 5000 tonnes by



2020. The strategy sets targets for Estonian aquaculture production to achieve more than 50% share of the Estonian internal market and more than 5 Million Euro export of aquaculture products by 2020, which means an increase in the total Estonian aquaculture production to more than 4300 tonnes by 2020 (including more than 3000 tonnes for internal market and more than 1300 tonnes for export). However, according to expert judgement (Jaanuska, 2015), these production targets are not realistic to achieve by 2020.

The strategy does not define the share of marine aquaculture in future targets but currently (2017) there is no functioning marine aquaculture in Estonia, except some test projects. Future competitiveness and production volumes are seen mainly to depend on the quality and price competition with the Norwegian salmon. The export target is expected to be achieved with the development of farming of highly demanded species such as European eel and crayfish, sturgeon, and whitefish (Tallinna Ülikool, Eesti Maaülikool, 2013). To enable future economic growth in fishing and aquaculture, new products are continuously being developed to make best use of what has previously been regarded as waste or side-streams of the industries such as mussel shells or fish skin. A more efficient use of resources and raw materials also supports the industries' marketing efforts by influencing consumer attitudes towards regionally and sustainably produced, high-quality fish and seafood products so that they are ready to pay a higher price for fish and other aquaculture products compared to imported products from retail markets. (ECORYS & S.Pro, 2017)

### 3. MARITIME TRANSPORT SECTOR

The development of the marine transport sector is heavily influenced by the altering levels of global demand over time and the development in other industry sectors. As to external factors, fuel price levels have been recognized to have a great impact on the current structure of the sector, since a large share of the costs consists of fuel costs. In particular, on shorter distances short sea shipping competes with land modes road and rail. Increases in fuel prices may imply a shift from road and rail to more energy efficient shortsea shipping. (ECORYS, 2012.) Before 2008, there was a continuous annual growth of two per cent in the national economy and transport volumes. Thereafter, there has been a time of uncertainty and stagnation. The basic business itself has not changed: the core business is the sea transport of goods and / or passenger traffic.

#### **EU-level strategies and policies**

The EU aims towards a form of mobility that is sustainable, energy-efficient and respectful of the environment. According to COM (2016), the aim is to reduce the adverse effects of freight transport by using multimodal transport - optimally combining various modes of transport within the same transport chain with a preference to non-road transport for long distance freight transport. Such a modal shift - a reduction of the share of road transport in all transport - towards less polluting and more energy efficient modes of transport can help to reduce the overall environmental impact of freight transport. In practical terms the aim is to shift 30% of cargo load from roads to water transport by 2030 and 50% by 2050. The future of long-haul shipping and ports is seen bright.

The EU blue growth vision for European Commission (2017) Vision 2030 foresees the following developments:

- Digitalisation and green shipping has changed the sector.
- Skilled labour is available due to adapted education.
- Most ships are e-navigation compatible with some automated functions.
- Environmentally sound shipping and port operations.
- Harmonized infrastructure network exists for alternative fuel bunkering and shore-sided electric power supply.

### **National/regional strategies for Finland**

Finnish shipping companies have long been specialized in a particular segment, for example, ro-ro traffic has been a strength for more than one operator (TEM 2016). According to TEM (2016), maritime transport will continue to be competitive. New forms of production, such as 3D printing, are seen as an opportunity to expand the logistics business by combining transport and production, meaning that part of the production can be carried out during transport (TEM, 2016).

Finland has its Maritime Transports Strategy (2014). A vision for 2030 is “A prosperous Finland – efficient sea routes”:

- Finnish foreign trade and domestic waterborne transport are smoothly functioning and socio-economically viable and international competitiveness is ensured also in winter.
- The Baltic Sea is safe and healthy and it attracts recreational activities and tourism to the area and provides high-quality maritime services for the use of the market area.
- Finnish maritime transport sector will become the leading service provider of the Baltic Sea countries in terms of sustainable logistic concepts.

### **National/regional strategies for Estonia**

For the Estonian Maritime administration, safe water traffic is strategic (VTA, 2017). The Government has adopted *Estonian Marine Policy 2012–2020* (Majandus- ja Kommunikatsiooniministeerium, 2011) as a long-term planning basis for the maritime sector. The goal of the development plan is to sustainably use Estonia’s marine resources and contribute to the development of the maritime sector. For that purpose, the development of maritime business should be supported, mainly accompanied by the improved safety of vessel traffic and other marine-related activities, the protection of marine and coastal environment and marine cultural heritage. The priorities of the development plan are:

1. Entrepreneurship environment in the marine sector is entrepreneur-friendly and competitive at international level.
2. The marine sector is safe, secure and contributes to diminished environmental pollution load.
3. Public sector activities support the development of the marine sector.
4. The marine education, research and development activities of Estonia meet the contemporary level requirements.
5. Coastal life and visiting environment are attractive and facilitate marine tourism and the development of local entrepreneurship and passing marine sector’s cultural heritage along to coming generations.

The goals by 2020 are the following:

- Added value in maritime sector increases quicker than GDP (share of maritime sector in GDP was 3-4% in 2016)
- Number of employees in maritime sector 25 000 (in 2016 it was 9100)
- At least 50 cargo ships under Estonian flag (currently 0)
- Cargo turnover of ports at least 35 Million tons (21 M tons in 2016)
- Container shipping will not decrease (202327 TEU in 2016)
- Investments into ports at least 18 MEUR/year
- Annual number of passengers on international lines at least 12 Million (10,17 Million in 2016);
- Annual number of cruise tourists at least 500 000 (500 000 in 2016);
- Estonian ship building and renovation sector is internationally competitive and its added value at least 100 MEUR;
- Number of recreational craft visiting Estonian ports is 20 000 in 2020;
- Network of small ports will be ready in 2018
- There are also environmental targets (achieve GES by 2020, decrease P content by 220 t and N content by 900 t during 2017-2020;
- Increase reaction capacity to pollution accidents from 1,8 km<sup>2</sup> during 24 hours in 2014 to 2,4 km<sup>2</sup> by 2020) but these are mainly based on Estonian Marine Strategy and its Programme of Measures (according to EU MSFD). (Majandus- ja Kommunikatsiooniministeerium 2011& 2017.)

*Estonian Transport Development Plan for 2014-2020* stresses the importance of marine transport. Estonia's location on the eastern border of the Baltic Sea allows to participate in international transit, which is growing in the long run following the global economic trends. Estonia has an interest in increasing the share of container goods in transit and adding value to them in addition to the storage and transport of goods. The plan also points out the importance of seaports as logistics centres that need to have good connections with inland (including railway cargo transport system). The plan predicts increase of capacity to service international cargo through Estonian ports to 60 Million tons by 2020 (in 2012 it was ca 43 Million tons). The government supports the development of all major cargo ports through the development of the necessary terrestrial connections and the creation and development of international contacts. The importance of ensuring ice-breaking capacity is stressed and it is planned to submit an application for EU funding for the construction of a new icebreaker (in addition to the icebreaker purchased by Port of Tallinn in 2012). The plan also foresees a measure to develop international ferry connections for passenger transport, especially development of service capacities of Tallinn Old City Harbour.

Opportunities for passenger transport through other ports will also be explored by the Estonian government and a network of small ports will be developed. Ferry connection with St. Petersburg is still a small part of the number of trips but in the long run, however, it is an important supplement to increasing the number of tourists. The country's potential to boost ferry connection with St. Petersburg is to promote tourism and business connections with Russia. The plan also supports the implementation of *the EU Blue Belt initiative* to facilitate intra-EU maritime transport. (Majandus- ja Kommunikatsiooniministeerium, 2013)

## 4. MARINE CONSTRUCTION SECTOR

The value creation in the marine construction industry relies on the ability of products to provide benefits to the buyer. Achieving individual transactions is primarily not the main strategic aim today as building longer-term relationships and networks has replaced the shorter-phase marketing cycles. A typical example of this is the rise of aftermarket services, i.e. value creation will be built on after-sales service, spare parts access, product and process updates. More marine cluster companies invest in a global service networks. Another aftermarket point of view is that nowadays marine cluster companies see the later stages of the life cycle of ships and equipment as business opportunities. (TEM, 2016) This development illustrates the increasing service-orientation development in advanced industrial markets.

### EU-level strategies and policies

From the EU perspective, many maritime technology sectors have the potential to provide more jobs, growth, renewable energy sources and climate-smart solutions. The aim of EU's intervention is to tackle these issues and create the conditions for mobilising investment in demonstration projects for new technologies, bringing them from lab to market and avoiding the costly duplication of work via programs such as Horizon 2020. (COM 2017).

In the Blue Growth Strategy (COM 2017), the Vision 2030 for shipbuilding is the following:

- Shipbuilding remains at the current level of economic importance
- Shipyards have completed the retro-fitting of existing vessels
- High-end, specialised vessels and maritime equipment
- Environmental monitoring technology seen as a separate emerging sector.

### National/regional strategies for Finland

In Finland, the maritime industry has emerged and developed around Finland's traditionally strong shipbuilding industry. The maritime industry and the entire maritime cluster have a significant impact on the Finnish economy and society. The *Maritime Transport Strategy for Finland* (2014) identifies opportunities in innovation in the energy efficiency of vessels, alternative fuels and emission reduction technologies. The Ministry of Employment and the Economy (TEM 2015) launched a maritime industry operating environment development programme 31 in December 2013. Its aim is to enhance the competitiveness and modernization of the maritime industry.

Major technology companies in the marine construction sector in Finland have recently made notable strategic investments in the South-West coast of Finland, which will positively influence the sector's future development and employment situation. There has been uncertainty in the future of traditional shipbuilding in the Plan4Blue region, however marine technology and cleantech companies have shown strong international performance. The sector's development is driven by strong orientation on sustainable development, e.g. clean shipping, cleantech solutions and energy efficiency, which are

central concerns currently in global markets and the solutions also enable compliance with latest international environmental legislation and rules.

### **National/regional strategies for Estonia**

The marine construction sector is covered by the national development plan “*Estonian Marine Policy 2012-2020*” in which “*Internationally competitive Estonian shipbuilding and repair operations*” is one of the objectives under Priority 1 “*The marine business environment is business friendly and internationally competitive*”. The measures of achieving this objective include increasing the competitiveness of both subsectors: shipbuilding and repair and recreational craft building and repair. The activities planned include improving availability of qualified workforce, supporting involvement of foreign experts and investments into infrastructure and production equipment as well as development of new technologies; mapping the need for renovation of state fleet; establishment of competence centre for recreational craft building; supporting product development and marketing in recreational craft building; creation of craft repair possibilities in the selected small ports. According to the development plan, the added value of ship building and repair sector should be at least 100 MEUR and of recreational craft building and repair sector at least 15 MEUR in 2020. (Majandus- ja Kommunikatsiooniministeerium, 2011)

## **5. MARITIME TOURISM SECTOR**

### **EU level strategies**

In the Commission Blue Growth Strategy, maritime tourism is seen as an important area for growth potential. The Vision for 2030 is the following:

- Wide range of visitors incl. non-EU
- Capacity limits of destinations are respected.
- Marinas offer an attractive environment year-round.
- Cooperation with local residents, local actors drive tourism
- Remote areas of BSR are better accessible.
- Pan-Baltic data portal on maritime tourism
- Nature tourism packages and combinations
- Cruise tourism as a gateway
- More senior citizens travelling
- Sustainability highly valued

### **The BSR-level strategies**

To advance the strategic guidance of tourism development in the BSR, “Tourism Policy in the Baltic Sea Region” steering group was created to ensure that *the EU Strategy for the Baltic Sea Region* is anchored all over the region (EUBSR, 2017). In 2014 the Commission outlined that it would ensure

that coastal and maritime tourism is included in other EU policies like IT connectivity, sustainable transport, safety issues and freedom of movement for workers. Cross-cutting policy aspects such as environmental protection, regional development, training, consumer protection and climate change mitigation and adaptation policies will also be considered.

On the BSR level, cross-boundary cooperation and aims to develop BSR as a coherent travel destination on a global tourism market, remain some of the key strategic objectives for the future (BSR Tourism Forum, 2017). The Estonian Tourist Board, in co-operation with the tourism industry and regional tourism organisations, developed common marketing strategies for those target markets with the highest tourism revenue potential, determined the roles of the various actors, and planned joint activities and the funding commitments/budgets for a two year period. Strategies include an action plan for managing demand in target markets, while representing the interests of the state, destinations and operators. (OECD, 2016)

In 2016 *the Baltic Cruise Dialogue* agreed to promote natural and cultural heritage in the Baltic Sea region, as well as local traditions, as a core business value to preserve and develop. Additionally, they agreed to promote a holistic approach for sustainability policy for maritime and coastal tourism in the Baltic Sea region, aiming at mitigating and minimizing the environmental impacts of cruise tourism to local inhabitants, to the marine environment and to air quality. The dialogue also agreed to work jointly to identify and remove bottlenecks hindering the effective implementation of the Baltic Special Area under MARPOL Annex IV by the agreed timeline 2019/2021, by sharing best practice and taking into account the need for timely planning of itineraries. (Maritime affairs, 2016)

A key element in the BSR tourism, Coastal Tourism, is defined as tourists spending at least one night in a municipality with a coastline or that has more than 50% of its area near the coast. In accordance with this definition, the share of coastal tourism is particularly significant in P4B region. Since 2012 the contribution of this sector to the EU's economy has been measured from surveys of tourists in their place of residence and accommodation establishments in these coastal municipalities. The figures indicate a steady growth in the spending, particularly from those residents outside the EU. The increasing tendency for more frequent but shorter vacations is indicated by the significant proportion of spending that is spent on travel. Along with high emphasis on ecological trends in tourism, previous reports have identified activities such as snorkeling and diving creating future potential for tourism development in Estonia and Finland (Ecorys, 2013).

The most common form of arrival for non-residents is by air (COM, 2017) yet, cruise tourism in another form of transportation associated with future growth in BSR (COM, 2012b). According to Baltic Transport Outlook 2030 study, the number of air passengers is expected to rise 62% between 2010-2030. This figure alone offers valuable insights to understand the nature of expected growth in the tourism sector. The global trend over time has been for air transport to grow at a somewhat faster pace than surface transport, e.g. by roads, rail or water, thus the share of air transport is gradually increasing (UNWTO 2017). Helsinki-Vantaa airport works as a central hub in the P4B area through which tourist flows spread to explore the Baltic countries and the Scandinavia. Since the Helsinki airport has been developed to respond growing passenger numbers, along with Finnair's strategic investments to new fleet and Asian routes, there is high growth potential in developing existing and designing new cross-boundary service paths to satisfy the diversifying tourist needs and to generate more turnover in P4B tourism sector overall in Estonia and Finland. Service infrastructure and logistics have a crucial role in facilitating growth in tourism. Currently the car is dominant as a means of transport in coastal tourism in the BSR (Source: Flash Eurobarometer, 2011). The improvement or

development of attractive public transport and modal split from in-land city-hubs to the coastline is considered highly necessary (Ecorys, 2013).

### **National/regional strategies for Finland**

Tourism development relies on long-term strategic aims in Finland, integrated on a national cross-industry level with a focus on digital & low-carbon means and being approved at the highest level of the government (OECD, 2016). In Finland the number of international tourist arrivals was 2,8 million in 2016. It is estimated that tourism will employ 180 000 people in total in Finland in 2025 (OECD 2016).

In Finland the strategic aims of collaboration and networking were utilized in the *Roadmap for Growth and Renewal in Finnish Tourism for 2015-25* that was compiled in 2014 to accelerate new ways to growth. Other development measures that currently guide tourism development include:

- Finrelax – Turning Finland into a top country of wellbeing tourism,
- Making the Finnish archipelago internationally known,
- Finland Stopover – making Finland a leading stopover country,
- Making tourism services easy to find and buy digitally,
- Creation of a demonstration project targeted at sustainable water-based tourism, utilising bioeconomy, clean technology and digital technology.

A number of specific tourism programmes and initiatives in line with the roadmap include:

- The Air Transport Strategy to 2030. This supports a major promotion of Helsinki Airport as an international transit hub for Asian routes, with a growth from 16 million passengers in 2014 to 23 million in 2030, backed by considerable investment in airport facilities. The strategy recommends improvements in networking and marketing in order to ensure a solid foundation for Finnish air transport and tourism.
- Finland's Strategy for the Arctic Region, which highlights the importance of tourism and the growth in nature and adventure experiences.
- National co-ordination of theme-based tourism development, supported by Outdoors Finland (summer activities) and Cultural Finland (culture and tourism) umbrella programmes.
- Development of Finland's first Food Tourism Strategy. One of the first actions was to establish the Hungry for Finland competition, as an inter-ministry initiative aimed at increasing awareness of food products and experiences, with participants including events, museums, service businesses, restaurants, cafes and countryside tourism companies.
- A commitment to sustainable development and the promotion of appropriate training and certification programmes for tourism businesses as well as supporting solutions that encourage future consumers to make sustainable choices. (OECD, 2016)

### **National/regional strategies for Estonia**

In Estonia, the number of international tourist arrivals was 3,1 million arrivals in 2016 (OECD 2016).

In Estonia, the overall budget for tourism development is stated in **the National Tourism Development Plan for 2014-20** as approximately EUR 123 million, the majority of which is financed through Enterprise Estonia/Estonian Tourist Board. The development plan aims at increasing the tourism sector by approximately a third by 2020. Tourism development contributes to the achievement of the objectives of the **competitiveness strategy Estonia 2020**, particularly by increasing the share of Estonia's exports in world trade, raising the employment rate, reducing youth unemployment and encouraging the development of international transportation routes (OECD, 2016). In the coastal region of northern Estonia, in Narva and Tallinn tourism development is considered one of the most important business areas (Põhja-Eesti Turism SA, 2016).

The main strategic goals of the National Tourism Development Plan 2014-20 in Estonia are to increase the awareness of Estonia as a travel destination; tourism product development, development of tourism attractions of international interest and regional tourism destinations (Ministry of Economic Affairs and Communications website, 2017). The section of the plan that focuses on Northern Estonia, lists all recent and current tourism development projects in P4B project area in Estonia, many of which are reaching to year 2020, see **Põhja-Eesti Turism SA** (2016) for further information. Current tourism product development relies on diversification and global trends such as well-being and demand for nature stimulate markets.

## 6. MARINE ENERGY SECTOR

### Global challenges and goals for energy production

Climate change is the most important global challenge impacting national energy policies and strategies. The EU is a member to the Kyoto Protocol, which is an attachment to the United States Framework Convention on Climate Change (UNFCCC), and so are the EU Member States. Kyoto Protocol requires the EU and its Member States to reduce emissions of greenhouse gases as agreed in the protocol. For every member of Kyoto Protocol, there is emission limit which the member is not allowed to exceed. Member States are required to report to UNFCCC. The Member States need to give so called country reports every four years. These reports include information of expected emission development, politics related to environmental issues, adaption to climate change, financing, education and national conditions.

The emission limits of the Kyoto Protocol are now being replaced by the requirements under the Paris Agreement. The Paris Agreement from 2015 is similarly under the UNCCC. It aims is to keep a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels, while pursuing efforts to limit the temperature increase to 1.5 degrees. The agreement also focuses on the ability of countries to deal with the impacts of climate change (mitigation). The Paris Agreement requires all Parties to put forward their best efforts through "nationally determined contributions" (NDCs) and to keep raising these efforts. All Parties report regularly on their emissions and on their implementation efforts. In 2018, Parties will take stock of the collective efforts to progress towards the temperature goal and to inform the preparation of NDCs. There will be a global stocktake every 5 years to assess the collective progress towards achieving the goal and to inform further individual



actions by Parties. On 5 October 2016, the threshold for entry into force of the Paris Agreement was achieved. The Paris Agreement entered into force on 4 November 2016. (UNFCCC web page.)

### **Marine energy production types**

According to the European Commission, marine energies have the potential to enhance the efficiency of harvesting the European energy resource, minimize land-use requirements of the energy sector and reduce the European greenhouse gas emissions by about 65 Mt CO<sub>2</sub> in 2020 (COM, 2012b).

Main marine energy types are marine wind energy, wave energy, tidal energy, and floating solar energy. In addition, ocean currents can be harnessed for energy production. In Europe, there are possibilities for wave energy and tidal energy. In Finland and Estonia, however, marine wind energy seems to be the only one that is interesting for investors and gaining at least some societal support.

According to Deloitte & WindEnergy (2017), GDP attributed to wind energy was 36 billion in Europe in 2016. Wind energy employed 260 000 people and the value of exports was 8 million. Subsectors include wind energy developers, wind turbine manufacturers, component manufacturers, service providers, and offshore wind energy substructures.

There are three main ways to convert wave energy into electricity, 1) Float or buoy systems that use the rise and fall of ocean swells to drive hydraulic pumps, 2) oscillating water column devices in which the in-and-out motion of waves at the shore enter a column and force air to turn a turbine, and 3) “tapered channel” or “tapchan” systems that rely on a shore-mounted structure to channel and concentrate the waves, driving them into an elevated reservoir. (OceanEnergyCouncil.com).

Tidal turbines are like wind turbines but driven by the sea. Unlike wind and waves, tidal currents are entirely predictable. Tidal energy can be exploited either 1) by building semi-permeable barrages across estuaries with a high tidal range or 2) by harnessing offshore tidal streams. (OceanEnergyCouncil.com).

### **EU level objectives and strategies**

In 2007, the EU set its 2020 goals for renewable energy (20% share of energy production), energy efficiency (improvement by 20%) and the reduction of greenhouse gases (reduction by 20%). Finland with 39,3% and Estonia with 28,6% have both done well in achieving the objectives on the share of renewable energy (Eurostat 2017).

The 2030 goals are stricter. They were adopted in 2014. *The 2030 climate and energy framework* sets three key targets for the year 2030:

- At least 40% cuts in greenhouse gas emissions (from 1990 levels)
- At least 27% share for renewable energy
- At least 27% improvement in energy efficiency

There are two means to reach the greenhouse gas emission target. The sectors that are part to the emissions trading system (ETS), need to cut emission by 43%, and the non-ETC sectors will need to

cut them by 30%. The latter goal will be reached by translating it to individual binding targets for Member States. Renewable energy targets will also be set for each Member State.

For energy efficiency, there are no national targets. The EU is targeting this goal through its Energy Efficiency Directive 2012/27/EU. In 2016, the Commission proposed an update to the Directive, including a new 30% energy efficiency target for 2030.

In 2016, the European Commission released a set of proposals on *a new rule book for the EU energy market*. The rules will allow the energy system to be ready for the rising share in variable renewable energy. By 2030, a half of the EU's energy needs will be met by renewables, up from 29% in 2014. (COM, 2016b).

By 2050, the EU intends to curb the greenhouse gas emissions even further. Already in October 2009, the European Council supported an EU objective to reduce greenhouse gas emissions by 80-95% by 2050 compared to 1990 levels (COM, 2017b). In March 2011, this decision was followed by "A Roadmap for moving to a competitive low carbon economy in 2050". By 2050, electricity will be produced without use fossil fuels, but fossil fuels may still be used in the industry and in transports (COM 2011).

Circular economy is considered to have a deep impact on the energy sector's future development although its clear role and effects are yet to be seen (Gustafsson, 2017).

### **Baltic Sea Region energy production strategies**

Energy is considered as one of the 13 Priority Areas of the *EUBSR strategy*. The strategic objectives of the EU include facilitation of diversification of energy sources and since security and sustainability are driving forces of development, attention must be paid to the resilience of infrastructure to natural and man-made disasters (EUBSR, 2017b). The EU's strategic aim is to improve the access to and the efficiency, sustainability, reliability and security of the energy markets (EUBSR, 2017b). The strategic objectives of the EU include facilitation of diversification of energy sources. As security and sustainability are driving forces of development, attention must be paid to the resilience of infrastructure to natural and man-made disasters (EUBSR, 2017b). Renewable energy sources are perceived as vital for the future sustainable infrastructure development in the BSR that supports coastal regions' communities, services and activities (ECORYS & S.Pro, 2017).

*The Baltic Sea Region Energy Cooperation Initiative* (BASREC) and its "Post Kyoto" project had the goal of developing energy policy strategies of the Baltic Sea Region for the future. According to the final report (BASREC 2012), the region has potential for a low carbon transformation as it is "endowed with vast natural resources in terms of biomass, wind and hydro power potential", and also has the required industrial and administrative capacities, technology, and knowledge. The main solutions to fighting climate change are seen in renewable energy, energy efficiency, nuclear energy (depending on the political and public support), and carbon capture and storage (CCS) (BASREC 2012, 27). The report states that wind power will likely "play a much greater role" in the Baltic Sea Region in the future, both onshore and offshore (BASREC 2012, 19). Solar power is seen as having potential on the longer run. As solar panels are evolving, more common raw materials may be used for manufacturing them in the future (TEM 2017). The industry experts that have participated the Plan4Blue project have considered solar and wind power as having greater future potential in the P4B region compared to wave energy.

A long-term strategic objective of the EU is to integrate all member states to wider energy networks (gas and electricity) so that importing energy from third countries is not necessary (EUBSR, 2017b). Estonia is currently not yet fully integrated into the EU energy networks and Estlink between Estonia and Finland is the only power connection of Estonia to another EU-country. The Baltic Energy Market Interconnection Plan (BEMIP) is an extension of the Nordic electricity market model to Estonia, Latvia and Lithuania. Monitored by the EUBSR, the BEMIP develops coordinated offshore wind farm connection solutions and other options to increase the use of renewable energy.

What will also change the infrastructure and technology related to energy provision and consumption is the EU's requirement that national governments will have to ensure that consumers can generate and store or consume their own electricity or sell it back to the grid. Every consumer will be able to offer demand-response and receive remuneration directly or through aggregators. (COM, 2016b) Another Interreg BSR project, BalticLINES (2016-2019), will provide information for MSP purposes about the energy corridors in the region.

In addition to energy production, the development of the blue energy sector also offers growth opportunities for companies in related industries, e.g. for companies providing smart meters and other monitoring devices and energy-efficiency tracking solutions for marine industries.

### **Finnish strategies for energy production**

Finland has a relatively high electricity demand due to cold winters and energy-intensive industries. (BASREC 2012, 18). Fuel consumption in transports is also high due to long distances. The 2030 target set by the EU for Finland for renewable energy sources is 38% of the overall energy consumption.

The Finnish government has published its *Government report on the National Energy and Climate Strategy for 2030* (TEM 2017). Marine energy is not at focus in the report. Neither is wind energy. According to the Strategy, the share of renewable energy will rise to more than 50 per cent during the 2020s and the self-sufficiency in renewable energy to more than 55 per cent. The greatest opportunities are seen in liquid biofuels and biogas. Coal will be phased out and the use of imported oil will be halved. The use of waste and side-streams for energy production will be promoted. Finland wants to invest in new technologies and to promote the commercialization of innovations for clean and smart energy systems and has joined the Mission Innovation project (2016) where countries have agreed to double their R&D investments in clean energy over five years.

The energy industry in Finland has provided comments on how to achieve the EU 2030 and national energy objectives. Marine energy is not at focus. The energy industry (Energiateollisuus web page 2016) calls for the following actions:

- Ensure the competitiveness and availability of domestic fuels
- Continue to support investments in small-scale energy production through household depreciation and energy support
- Continue investment in new technologies for renewable energy and energy efficiency
- Support major demo projects for new clean energy technologies

According to a recent survey (Energiateollisuus 2016), Finnish citizens consider the following as the most important goals of energy policy: reduction of emissions and fighting climate change, increasing the share of renewable energy, reasonable energy price, self-sufficiency in energy, and commercialization of energy innovations. In 2016, 182 new wind energy units were built in Finland with a combined capacity of 570 MW. This raised the wind power capacity to 552 units and 1533 MW. Electricity production by wind power in 2016 was 3.1 TWh, which was 3.6 % of electricity consumption (Tuulivoimayhdistys.fi)

Marine energy production is very insignificant in Finland (Tike 2016). The first offshore wind farm in Finland was built in front of Tahkoluoto, Pori in 2017. Wind conditions are better at sea than on land, and components are easier to move. Residents on land are typically against windmills in their vicinity. Waves, humidity, salinity, and ice still create challenges for marine wind energy. Finnish shipbuilding and offshore expertise is useful also for marine wind energy construction. (Teknologiateollisuus.fi)

### **Estonian strategies for energy production**

*The Estonian National Development Plan of the Energy Sector Until 2030* (ENMAK 2030) was adopted in October 2017. The plan brings together the future activities related to the electricity, heating and fuel sector and energy use in the transport and housing sectors. ENMAK 2030 describes Estonian energy policy goals until 2030, the vision for energy sector until 2050 as well as ENMAK 2030 general and specific objectives and measures to achieve them.

The plan defines amongst others the following objectives/expected results for 2030:

- The annual final energy consumption will remain 32 TWh (as in 2010), the share of renewable energy will be 50% of the final energy consumption and at least 28% of primary energy consumption. The primary energy consumption will become significantly more efficient. The construction of new renewable electricity production facilities will take place under open electricity market conditions without additional national support.
- 80% of the heat produced in Estonia is produced on the basis of renewable energy sources, the importance of local energy sources in heat production is further increased by peat. The objective is mainly achieved on a market basis. The reduction of greenhouse gas emissions in the energy sector by 2030 will be at least 70% (as compared to 1990), and by 2050 it is realistic to achieve a reduction of greenhouse gas emissions by more than 80%.
- The production of oil shale electricity will decrease and shale oil production will increase, and to achieve this, the development plan foresees the need for the development of a favourable tax environment for investments.
- The long-term use of biofuels in the period up to 2050 is planned to generate electricity and heat in line with the growth of forests. The use of biomethane and other alternative motor fuels is increasing.
- The share of fuel-free energy sources in final consumption will be at least 10% in 2030. The potential of hydropower is in use today, the use of solar energy in small solutions will increase by up to 100 MW by 2050, covering almost 1% of the country's electricity demand. In 2050 wind energy could cover a third of the country's electricity consumption.

- In 2030 domestic consumption of primary energy is 10% less than in 2012. The energy intensity of the Estonian economy will decrease from the current 5,6 MWh/1000 €<sub>SKP 2012</sub> to 2 MWh/1000 €<sub>SKP2012</sub>
- Estonia has achieved energy independence by 2030 (vs the dependency rate of 13.6% in 2013). The share of imported electricity will be 0% (vs 0% in 2012).

The financing of the development of the energy sector is planned from a variety of sources. The financing of the measures of the development plan from the state budget is planned only for activities in which market failures exist to achieve the goals of the development plan or which are necessary for the fulfilment of the tasks of the state. The biggest burden of financing lies on the private sector, therefore the state's primary task in implementing the development plan is to create an attractive investment environment through legislation and tax policy.

*The vision for 2050* is described as follows: In 2050, Estonia will mainly use domestic resources to meet its energy needs, not only in electricity, but also in heat production and transport. Investments in the energy sector have led to a doubling of the efficiency of using local fossil fuels compared to today's level. According to the objectives set in the "Energy Roadmap 2050", the CO<sub>2</sub> emissions in the energy sector have decreased by more than 80% (compared to 1990 levels). In the developed regional gas market, gaseous fuels of indigenous origin in Estonia are competitive and their production capacity will enable to cover, if necessary, up to one third of the gas consumption in Estonia.

Estonia has become the country exporting energy using modern and environmentally-friendly technologies in the North Baltic energy market. The energetic independence of Estonia and its long-term consolidation are the key to the economic well-being of the people of the country, the competitiveness of the companies operating in the country and the energy security of Estonia.

The state has developed a solid and long-term vision of resource ownership policy that supports the development of the Estonian industrial sector. The state ownership profit from use of energy resources is directed primarily towards sustainable energy supply programs, thus ensuring the continuation of energy independence of the state after the exhaustion of fossil fuel resources.

*The "Renewable Energy Action Plan Until 2020"* and its operational programme represent the road map for achieving Estonia's objective in the field of energy from renewable sources – 25% share of renewable energy in final consumption by 2020. The action plan also foresees an investment support for marine wind farms with the result indicator of 500 MW installed offshore wind farms by 2020. (Majandus- ja Kommunikatsiooniministeerium, 2010)

## **Renewable energy for shipping**

So far, we have discussed the strategies for energy production, including the possibilities for producing energy at the sea. For a sustainable blue economy, we also need to consider how the blue industries are consuming energy. The International Convention for the Prevention of Pollution from Ships (MARPOL) has stipulated mandatory technical and operation measures, which require more efficient maritime energy use with less emissions. The regulations came into force in 2013. The industry itself has set targets to reduce carbon dioxide emissions by 20% by 2020 and 50% by 2050.

For reaching the targets, the shipping industry needs cleaner fuel and power options. Rising bunker fuel prices on a globally volatile market also provide reason to scale up shipping solutions that are based on renewable sources and technologies. (IRENA 2015, 3.) LNG is an option that produced less carbon emissions than regular bunker fuel oil.

**Renewable energy options for ships** of all sizes include options for primary, hybrid and/or auxiliary propulsion, as well as on-board and shore-side energy use. Potential wind energy sources for shipping include soft sails, fixed wings, rotors, kites and conventional wind turbines. In addition, there are applications on solar photovoltaics, biofuels, wave energy and the use of super capacitors charged with renewables. These solutions can be integrated through retrofits to the existing fleet or incorporated into new shipbuilding and design. (IRENA 2015, 4). According to IRENA 2015, a small number of new ships are striving for 100% renewable energy or zero-emissions technology for primary propulsion. The IRENA report concludes that a set of organisational/structural, behavioural, market and non-market barriers needs to be removed before renewables can make meaningful contributions to the energy needs of the shipping sector.

## 7. CONCLUDING REMARKS AND FACTORS AFFECTING THE BLUE SECTOR STRATEGIES IN ESTONIA AND FINLAND

### Infrastructure

To enable and support the growth of the blue economy in the BSR, the infrastructure plays a crucial role for all industries. The EU level aims to transfer 30% of cargo from roads to waterways by 2030 and more than 50% by 2050 (COM, 2011) offers blue growth potential not only to ports and shipping companies in the P4B area but to wider service networks connected to logistics of people and cargo. Infrastructure development secures and improves the accessibility to relatively distant settlements and raw materials extraction sites in Finland and Estonia. The strategic importance of the infrastructure is further amplified by the needs relating to the aging society and sparsely populated areas that are heavily affected by the availability and frequency of transport services. One key transportation aspect to consider is rising from the anticipated coastal tourism development: the coastal areas and archipelago have been identified as the key resources and locations for future sustainable blue tourism. Since transport networks and modes are recognised as not being fully interoperable in the BSR (Baltic Lines, 2017), there is potential to further improve transportation efficiency and to reduce logistical bottlenecks. Possible new EU-level pilot programs will enable the P4B region to tap into the development of multimodal transport that connects the area and the current logistics nodes firmly into the BSR industrial transportation links and even beyond, eg. to Russian Federation. Opening a new, more direct, passenger and cargo transport line between ports in eastern Finland and Estonia could well support the EU blue growth aims and future cross-boundary cooperation.

### Sustainability

This report provides a multitude of current issues and trends that outline some of the key development trends within the P4B industries and shed light on what possibilities some industry-specific future development trends may enable in terms of sustainable growth. Some of these forces

may have stronger and earlier impacts within the industries than is now expected. The forces that may have a major impact on the future of all maritime industries include:

- Ø Fossil fuels substitute for renewable resources
- Ø Climate change
- Ø Increasing global competition
- Ø Raw materials transport routes change
- Ø Marine resources use
- Ø International and national restrictions and regulations
- Ø ICT, digitization and the use of "big data"
- Ø Energy Efficiency and Emission Reduction
- Ø Recycling and sustainable development
- Ø The level of maritime transport costs (TEM 2016).

These forces both challenge the current development processes within industries and value networks but simultaneously, will enable the blue industries to work towards supporting sustainable growth. Being aware of the major trends and proactively developing new solutions to overcome the increasing global competition and societal challenges, will offer growth potential within BSR and beyond. When it comes to future aiming for future growth of industries, studies have indicated that sustainability development and investments not only support individual companies' and industries differentiation and competitiveness but, they also build and strengthen regional-level (e.g. BSR or coastal) brand positioning and national country brands (see for example: Lähteenmäki *et al.*, 2017; Brodie and Benson-Rea, 2016; Fetscherin, 2010; Yan, 2008 and Ma, 2004). Building and maintaining such intangible assets, like a country, region or industry brand, is a core factor in sustainable customer value creation and business success, e.g. in tourism where products have strong regional and place-related connections. All P4B key industry sectors have identified and applied various methods to achieve sustainability goals but joint efforts in cross-boundary and cross-industry coordination may enable new innovative openings. The individual sectors of the blue economy are characterized to be interdependent and, they rely on common skills and shared infrastructure such as ports and electricity distribution networks (European Commission, 2012). This interconnectedness and linkages of the blue industries to the wider regional and national economy should be noted when evaluating the sustainability of individual activities in the MSP processes. The blue industry boundaries and sustainability effects are typically not limited to any single MSP area.

### **Other future development perspectives for the blue growth industries**

In the changing global markets with new sustainability challenges, a question is raised on who should be the key stakeholder groups of the blue economy development. For example, since marine and maritime sectors are now increasingly utilizing new technology and IT solutions and providing more intangible value, i.e. services, to their customers and, many blue industries now fostering transparency and responsibility of operations – should more reference groups (stakeholders) be actively involved in the business development processes? High customer involvement may lead to improved value creation processes and thus high sustainability performance. Another changing aspect in the future is the age and cultural structures of the population. Arguably, the cultural diversity of population is high and increasing especially in the capital city regions of the P4B area, which may provide challenges for adaptation but also offer new skills and growth opportunities for industries seeking to adapt to international markets. Aging population effects may become especially apparent

in the rural areas of the P4B region. Demographic changes and global consumption trends also impact the values and norms apparent in the market. Views on ownership and possession of products, what meanings are perceived and what outcomes are expected from consumption processes, how working time and free time is valued and allocated etc. In order to improve the productivity levels of the blue industries – along with maximum and smart use of digitalization; cleantech solutions, artificial intelligence, augmented and virtual reality, sensory devices and 3D printing etc. - right kind of skills, know-how and education should be made available. Joint marketing efforts are needed to promote and build (global) image for BSR and to design attractive cross-border and cross-industry blue service paths and products.

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## ANNEX 1. BLUE GROWTH STRATEGIES

### 1. Energy sector

Policy	Country	Details	Time line	Sector
COM, 2011	EU	"A Roadmap for moving to a competitive low carbon economy in 2050". By 2050, electricity will be produced without use fossil fuels, but fossil fuels may still be used in the industry and in transports.	2050	Energy
Energy Efficiency Directive 2012/27/EU (upload at 2016)	EU	<ul style="list-style-type: none"> <li>○ At least 40% cuts in greenhouse gas emissions (from 1990 levels)</li> <li>○ At least 27% share for renewable energy</li> <li>○ At least 27% improvement in energy efficiency</li> </ul> <p>There are two means to reach the greenhouse gas emission target. The sectors that are part to the emissions trading system (ETS), need to cut emission by 43 %, and the non-ETS sectors will need to cut them by 30 %.</p>	2030	Energy
Paris Agreement from 2015	EU, World	It aims is to keep a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels, while pursuing efforts to limit the temperature increase to 1.5 degrees.	meeting 2018 report every 5 years	Energy
COM, 2016b	EU	By 2030, a half of the EU's energy needs will be met by renewables, up from 29% in 2014. Requirement that national governments will have to ensure that consumers can generate and store or consume their own electricity or sell it back to the grid. Every consumer will be able to offer demand-response and receive remuneration directly or through aggregators.	2030	Energy
COM, 2017b	EU	By 2050, the EU intends to curb the greenhouse gas emissions even further. Already in October 2009, the European Council supported an EU objective to reduce greenhouse gas emissions by 80-95% by 2050 compared to 1990 levels	2050	Energy

Policy	Country	Details	Time line	Sector
EUSBSR (EU Strategy for the Baltic Sea Region), 2017b	EU	<p>The EU's strategic aim is to improve the access to and the efficiency, sustainability, reliability and security of the energy markets. The strategic objectives of the EU include facilitation of diversification of energy sources. As security and sustainability are driving forces of development, attention must be paid to the resilience of infrastructure to natural and man-made disasters.</p> <p>A long-term strategic objective of the EU is to integrate all member states to wider energy networks (gas and electricity) so that importing energy from third countries is not necessary.</p>		Energy
TEM 2017	Finland	<p>The aim of the agreements is to improve the efficiency of energy use in industry, the energy and service sectors, the real estate sector, the municipal sector and in oil-heated properties.</p> <p>The agreements are made on a voluntary basis and are a means jointly chosen by the central government and the participating sectors for meeting the international energy efficiency obligations imposed on Finland without having to introduce new legislation or other new coercive measures. According to the Strategy, the share of renewable energy will rise to more than 50 per cent during the 2020s and the self-sufficiency in renewable energy to more than 55 per cent. The greatest opportunities are seen in liquid biofuels and biogas. Coal will be phased out and the use of imported oil will be halved. The use of waste and side-streams for energy production will be promoted. Finland wants to invest in new technologies and to promote the commercialization of innovations for clean and smart energy systems and has joined the Mission Innovation project (2016) where countries have agreed to double their R&amp;D investments in clean energy over five years.</p> <p>Ensure the competitiveness and availability of domestic fuels.</p> <p>Continue to support investments in small-scale energy production through household depreciation and energy support.</p> <p>Continue investment in new technologies for renewable energy and energy efficiency.</p> <p>Support major demo projects for new clean energy technologies.</p> <p>Maintain the conditions of the existing water and wind power capacity.</p>	2020-2030	Energy

Policy	Country	Details	Time line	Sector
BEMIP (Baltic Energy Market Interconnection Plan) 2017	European Commission and Denmark, Germany, Estonia, Latvia, Lithuania, Poland, Finland, and Sweden. Norway participates as an observer.	The Baltic Energy Market Interconnection Plan (BEMIP) is an extension of the Nordic electricity market model to Estonia, Latvia and Lithuania. Monitored by the EUBSR, the BEMIP develops coordinated offshore wind farm connection solutions and other options to increase the use of renewable energy.	2025	Energy
ENMAK 2030 (Estonian National Development Plan of the Energy Sector Until 2030)	Estonia	<p>The annual final energy consumption will remain 32 TWh (as in 2010), the share of renewable energy will be 50% of the final energy consumption and at least 28% of primary energy consumption. The primary energy consumption will become significantly more efficient. The construction of new renewable electricity production facilities will take place under open electricity market conditions without additional national support.</p> <p>80% of the heat produced in Estonia is produced on the basis of renewable energy sources, the importance of local energy sources in heat production is further increased by peat. The objective is mainly achieved on a market basis. The reduction of greenhouse gas emissions in the energy sector by 2030 will be at least 70% (as compared to 1990), and by 2050 it is realistic to achieve a reduction of greenhouse gas emissions by more than 80%.</p> <p>The production of oil shale electricity will decrease and shale oil production will increase, and to achieve this, the development plan foresees the need for the development of a favorable tax environment for investments.</p> <p>The long-term use of biofuels in the period up to 2050 is planned to generate electricity and heat in line with the growth of forests. The use of biomethane and other alternative motor fuels is increasing.</p> <p>The share of fuel-free energy sources in final consumption will be at least 10% in 2030. The potential of hydropower is in use today, the use of solar energy in small solutions will</p>	2030	Energy

Policy	Country	Details	Time line	Sector
		<p>increase by up to 100 MW by 2050, covering almost 1% of the country's electricity demand. In 2050 wind energy could cover a third of the country's electricity consumption.</p> <p>Estonian offshore wind energy resources could be 250 MW by 2020 and 1550 MW by 2030.</p> <p>In 2030 domestic consumption of primary energy is 10% less than in 2012. The energy intensity of the Estonian economy will decrease from the current 5,6 MWh/1000 €SKP 2012 to 2 MWh/1000 €SKP2012</p> <p>Estonia has achieved energy independence by 2030 (vs the dependency rate of 13.6% in 2013). The share of imported electricity will be 0% (vs 0% in 2012).</p>		
GPCP 2050 (General Principles of Climate Policy until 2050, from 2017)	Estonia	Set to reduce the emission of GHG by 80% by 2050 in comparison with the emission levels of 1990.	2050	Energy

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## 2. Marine sector (Shipping)

Policy	Country	Details	Time line	Sector
The International Convention for the Prevention of Pollution from Ships (MARPOL) from 2013	World	The industry itself has set targets to reduce carbon dioxide emissions by 20% by 2020 and 50% by 2050. For reaching the targets, the shipping industry needs cleaner fuel and power options. Since 1 January 2015 the sulphur limit for fuel oil used by ships in SOx Emission Control Areas (ECAS) established by IMO has been 0.10% m/m.	2050	Shipping
EU Commission (2015)	EU	Trans-European Transport Networks (TEN-T) aims for a more sustainable EU transport system. EU's Detailed Implementation Plan for Motorways of the Sea (2015) Further develop maritime spatial planning processes with interactions between land and sea Better connections between MoS and short-sea shipping with blue growth and maritime spatial planning. Promote collaboration among countries concerning maritime spatial planning Encourage information sharing among countries and regions in this field.	(2030)	Shipping
COM, 2016	EU	Aim is to shift 30% cargo load from roads to water transport by 2030 and 50% by 2050	2030-2050	Shipping
EU Commission (2017)	EU	Digitalisation and green shipping has changed the sector. Skilled labour is available due to adapted education. Most ships are e-navigation compatible with some automated functions. Environmentally sound shipping and port operations. Harmonized infrastructure network exists for alternative fuel bunkering and shore-sided electric power supply	2030	Shipping
European Commission, 2017, Vision 2030	EU	Shipbuilding remains at the current level of economic importance. Shipyards have completed the retro-fitting of existing vessels. High-end, specialised vessels and maritime equipment. Environmental monitoring technology seen as a separate emerging sector.	2030	Shipbuilding
The Ministry of Transport and Communications Finland. Finland's maritime strategy	Finland	A vision for 2030 is "A prosperous Finland – efficient sea routes". Finnish foreign trade and domestic waterborne transport are smoothly functioning and socio-economically viable and international competitiveness is ensured also in	2030	Shipping

Policy	Country	Details	Time line	Sector
2014–2022.		<p>winter.</p> <p>The Baltic Sea is safe and healthy and it attracts recreational activities and tourism to the area and provides high-quality maritime services for the use of the market area.</p> <p>Finnish maritime transport sector will become the leading service provider of the Baltic Sea countries in terms of sustainable logistic concepts.</p>		
Estonian Marine Policy 2012–2020 (Majandus- ja Kommunikatsiooniministeerium, 2011)	Estonia	<ul style="list-style-type: none"> <li>• Entrepreneurship environment in the marine sector is entrepreneur-friendly and competitive at international level.</li> <li>• The marine sector is safe, secure and contributes to diminished environmental pollution load.</li> <li>• Public sector activities support the development of the marine sector.</li> <li>• The marine education, research and development activities of Estonia meet the contemporary level requirements.</li> <li>• Coastal life and visiting environment are attractive and facilitate marine tourism and the development of local entrepreneurship and passing marine sector’s cultural heritage along to coming generations.</li> <li>• Added value in maritime sector increases quicker than GDP (share of maritime sector in GDP was 3-4% in 2016);</li> <li>• number of employees in maritime sector 25 000 (in 2016 it was 9100);</li> <li>• at least 50 cargo ships under Estonian flag (currently 0);</li> <li>• cargo turnover of ports at least 35 Million tons (21 M tons in 2016);</li> <li>• container shipping will not decrease (202327 TEU in 2016);</li> <li>• Investments into ports at least 18 MEUR/year;</li> <li>• annual number of passengers on international lines at least 12 Million (10,17 Million in 2016);</li> <li>• annual number of cruise tourists at least 500 000 (500 000 in 2016);</li> <li>• Estonian ship building and renovation sector is internationally competitive and its added value at least 100 MEUR;</li> <li>• number of recreational craft visiting Estonian ports is 20 000 in 2020;</li> <li>• network of small ports will be ready in 2018</li> </ul>	2020	shipping tourism

Policy	Country	Details	Time line	Sector
		<p>There are also environmental targets</p> <ul style="list-style-type: none"> <li>· achieve GES by 2020, decrease P content by 220 t and N content by 900 t during 2017-2020;</li> <li>· increase reaction capacity to pollution accidents from 1,8 km<sup>2</sup> during 24 hours in 2014 to 2,4 km<sup>2</sup> by 2020</li> </ul>		
Transport Development Plan for 2014-2020	Estonia	<ul style="list-style-type: none"> <li>· predicts increase of capacity to service international cargo through Estonian ports to 60 Million tons by 2020 (in 2012 it was ca 43 Million tons).</li> <li>· to participate in international transit, which, in the light of global economic trends, is growing in the long run. Estonia has an interest in increasing the share of container goods in transit and adding value to them in addition to the storage and transport of goods.</li> <li>· the importance of seaports as logistics centres that need to have good connections with inland (including railway cargo transport system).</li> <li>· the development of all major cargo ports through the development of the necessary terrestrial connections and the creation and development of international contacts.</li> <li>· The importance of ensuring ice-breaking capacity is stressed and it is planned to submit an application for EU funding for the construction of a new icebreaker (in addition to the icebreaker purchased by Port of Tallinn in 2012).</li> <li>· to develop international ferry connections for passenger transport, especially development of service capacities of Tallinn Old City Harbour. Also opportunities for passenger transport through other ports will be explored and a network of small ports will be developed. Ferry connection with St. Petersburg is still a small part of the number of trips into this direction, but in the long run, however, is an important supplement to increasing the number of tourists. The country's potential to boost ferry connection with St. Petersburg is to promote tourism and business connections with Russia.</li> <li>· the implementation of the EU Blue Belt initiative to facilitate intra-EU maritime transport. (Majandus- ja Kommunikatsiooniministeerium, 2013)</li> </ul>	2020	

Policy	Country	Details	Time line	Sector
Estonian marine strategy 2016-2020	Estonia	<ul style="list-style-type: none"> <li>the development of marine business should be supported mainly accompanied by the improved safety of vessel traffic and other marine-related activities</li> <li>the protection of marine and coastal environment and marine cultural heritage.</li> </ul>	2020	shipping tourism

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6. Detailed Implementation Plan for Motorways of the Sea. MOVE/B1/2015-201 | STUDY ON THE TEN-T MOTORWAYS OF THE SEA HORIZONTAL PRIORITY
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### 3. Tourism sector

Policy	Country	Details	Time line	Sector
OECD (Organisation for Economic Co-operation and Development), 2016	EU	A commitment to sustainable development and the promotion of appropriate training and certification programmes for tourism businesses as well as supporting solutions that encourage future consumers to make sustainable choices.	2030	Tourism
OECD (Organization for Economic Co-operation and Development), 2016	EU/Estonia	<p>Estonian Tourist Board, in co-operation with the tourism industry and regional tourism organisations, developed common marketing strategies for those target markets with the highest tourism revenue potential, determined the roles of the various actors, and planned joint activities and the funding commitments/budgets for a two year period. Strategies include an action plan for managing demand in target markets, while representing the interests of the state, destinations and operators.</p> <p>Tourism development contributes to the achievement of the objectives of the competitiveness strategy Estonia 2020, particularly by increasing the share of Estonia's exports in world trade, raising the employment rate, reducing youth unemployment and encouraging the development of international transportation routes (OECD, 2016)</p>	2030	Tourism
COM, 2017, Vision for 2030	EU	Wide range of visitors incl. non-EU. Capacity limits of destinations are respected. Marinas offer an attractive environment year-round. Cooperation with local residents. Remote areas of BSR are better accessible. Pan-Baltic data portal on maritime tourism. Nature tourism packages and combinations. Cruise tourism as a gateway. More senior citizens travelling. Sustainability highly valued. Local actors drive tourism.	2030	Tourism
National Tourism Development Plan 2014-20	Estonia	<ul style="list-style-type: none"> <li>• as approximately EUR 123 million, the majority of which is financed through Enterprise Estonia/Estonian Tourist Board. The development plan aims at increasing the tourism sector by approximately a third by 2020.</li> <li>• are increasing the awareness of Estonia as a travel destination;</li> <li>• tourism product development, development of tourism attractions of international interest and regional tourism destinations</li> </ul>	2020	Tourism
Baltic Cruise Dialogue (Maritime affairs, 2016)	Estonia	Was agreed to promote natural and cultural heritage in the Baltic Sea region, as well as local traditions, as a core business value to preserve and develop. Additionally, they agreed to pro-mote a holistic approach for sustainability policy for maritime and coastal tourism in the Baltic Sea region, aiming at mitigating and minimizing the environmental	2019/2021	Tourism

Policy	Country	Details	Time line	Sector
		impacts of cruise tourism to local inhabitants, to the marine environment and to air quality. The dialogue also agreed to work jointly to identify and remove bottle-necks hindering the effective implementation of the Baltic Special Area under MARPOL Annex IV by the agreed timeline 2019/2021, including through sharing of best practice and taking into account the need for timely planning of itineraries.		
Roadmap for Growth and Renewal in Finnish Tourism for 2015-25, 2014	Finland	Finrelax – Turning Finland into a top country of wellbeing tourism; Making the Finnish archipelago internationally known; Finland Stopover – making Finland a leading stopover country; Making tourism services easy to find and buy digitally; Creation of a demonstration project targeted at sustainable water-based tourism, utilising bioeconomy, clean technology and digital technology.	2015-2025	Tourism
The Air Transport Strategy to 2030.	Finland	This supports a major promotion of Helsinki Airport as an international transit hub for Asian routes, with a growth from 16 million passengers in 2014 to 23 million in 2030, backed by considerable investment in airport facilities. The strategy recommends improvements in networking and marketing in order to ensure a solid foundation for Finnish air transport and tourism.	2030	Tourism
Development of Finland's first Food Tourism Strategy.	Finland	One of the first actions was to establish the Hungry for Finland competition, as an inter-ministry initiative aimed at increasing awareness of food products and experiences, with participants including events, museums, service businesses, restaurants, cafes and countryside tourism companies.		Tourism
Finland's Strategy for the Arctic Region	Finland	Highlights the importance of tourism and the growth in nature and adventure experiences.		Tourism

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#### 4. Blue bio-economy

Policy	Country	Details	Time line	Sector
COM, 2012	EU	The Euro-pean Commission's Strategy and Action Plan on bioeconomy builds on a circular thinking and links sustaina-ble bioeconomy to all parts of the green and blue economy. It recognises a future challenge and a need to explore how to transform the increased demand of biomass and bio-based products into sustainable solutions in the entire value chain from biomass to food, innovative bio-based products and bioenergy.	since 2012	Blue bioeconomy
EU Commission's strategic guidelines for sustainable aquaculture (2013a,b)	EU	The goal is that "fishing and aquaculture activities are environmentally sustainable in the long-term ... with the objectives of achieving economic, social and employment benefits..." (EU2013a, Article 2(1)). According to the EU Commission's strategic guidelines for sustainable aquaculture ((2013b), the goal is to grow significantly. Of the EU consumption of fishery and aquaculture products (13.2 million tonnes), 25% comes from EU fisheries, 10 % from the EU aquaculture, and 65% from imports. EU aims to fill the gap at least partly by "environmentally, socially and economically sustainable EU aquaculture". One percent of EU consumption means around 3000 to 4000 jobs if produced by EU aquaculture. (EU 2013b, 2). Business diversification may provide additional sources of income: fish farming may for example be integrated with angling and tourism (EU 2013b, 7).  The Regulation required EU Member States to draft aquaculture strategies by 2014 that improve competitive-ness, enable innovation and diversification, lessen the administrative burden, and promote access to suitable locations (preamble 55, Article).		Blue bioeconomy/ fishing and aquaculture
EU regulation 1380/2013 on the Common Fisheries Policy	EU	EU regulation 1380/2013 on the Common Fisheries Policy states that European aquacul-ture should contribute to meeting the growing world demand for aquatic food and provide growth and jobs for EU citizens (preamble 53).		Blue bioeconomy/ fishing and aquaculture
European Commission (2017) Vision 2030	EU	Clear regulatory framework in place. Bio-base products & services available. Mussel farms for environmental services. BSR is a global knowledge hub of biorefinery and circular economy. Wild biomass for biogas, feed or food ingredient. Commercial macroalgae cultivation. Blue biotechnology upscaling. Positive consumer attitudes.	2030	Blue bioeconomy/ fishing and aquaculture

COM,2017	EU	Fishing tourism development is one example of helping fishermen to diversify their activities and reduce the pressure on stocks. Another area is the promotion of the local catches in restaurants and hotels.	since 2017	fishing
Common Fisheries Policy	EU	The aim continues to support the traditional European fisheries sector by making fishing sustainable and simultaneously, to improve the economic and social situation of fishermen.	since 2013	fishing
Estonian aquaculture strategy, 2013	Estonia	The strategy sets targets for Estonian aquaculture production to achieve more than 50% share of Estonian internal market and more than 5 Million Euro export of aquaculture products by 2020, which means increase of total Estonian aquaculture production to more than 4300 tonnes by 2020 (including more than 3000 tonnes for internal market and more than 1300 tonnes for export).	2020	Blue bioeconomy/ fishing and aquaculture
The Finnish aquaculture strategy (MMM 2014)	Finland	Finnish aquaculture targets to grow from current 13 000 tonnes to a yearly production level of 20 000 tonnes by 2022.	2022	fishing

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2. COM (2012) Communication from the European Commission; Innovation for Sustainable Growth: A Bio economy for Europe, 60 final.
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## 5. Blue growth strategies which include all sectors

Policy	Country	Details	Time line	Sector
EU blue growth strategy (EU 2012)	EU			Blue bioeconomy/ fishing and aquaculture > all blue economy sectors
Directorate-General for Maritime Affairs and Fisheries (European Commission) ECORYS; S.Pro		Towards an implementation strategy for the Sustainable Blue Growth Agenda for the Baltic Sea Region.		All blue economy sectors
Prime Minister's office Finland	Finland	Finland's Strategy for the Baltic Sea Region (2017)		All blue economy sectors

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