EUROPEAN
COMMISSION

Brussels, 31.3.2017
SWD(2017) 128 final

COMMISSION STAFF WORKING DOCUMENT

Report on the Blue Growth Strategy
Towards more sustainable growth and jobs in the blue economy

Staff working document on Blue Growth 2013-2016

CONTENTS

EXECUTIVE SUMMARY

The blue economy can be a driver for Europe's welfare and prosperity. That was the message of the Blue Growth Strategy adopted by the Commission in 2012. Since then, the Commission has undertaken a series of steps to translate it into actions. It has launched initiatives in many policy areas related to Europe's oceans, seas and coasts, facilitating the cooperation between maritime business and public authorities across borders and sectors, and stakeholders to ensure the sustainability of the marine environment.

A contribution to jobs and growth

Europe's maritime sector employs over 5 million jobs generating almost EUR 500 billion a year, with a potential to create many more jobs. Five years ago 99% of all jobs could be classified under five broad areas: living resources, non-living resources, transport, shipbuilding and tourism. But economic analysis shows that the landscape is changing. Explosive growth in the installation of offshore wind farms means that a sixth sector, offshore renewable energy, is now a major contributor to employment, accounting for 150,000 jobs. The OECD predicts that looking to 2030, many ocean-based industries have the potential to outperform the global economy as a whole, both in terms of value added and employment. The output of the global ocean economy is estimated at EUR 1.3 trillion today and this could more than double by 2030. The European Commission has since reiterated that Europe should not miss this opportunity.

A policy for innovation

The focus on five innovative, high-potential maritime sectors (blue energy, aquaculture, coastal an maritime tourism, blue biotechnology and sea-bed mining) adopted in 2012 has delivered. A way for tidal and wave energy to achieve their potential has been agreed, regulatory barriers to aquaculture are being tackled, employment in maritime tourism is growing, products from marine biotechnology research are reaching the market and technologies for monitoring the environmental impact of deep-sea mining have been developed. But less progress has been made on remedying one key weakness, the lack of public and private risk funding for those most innovative maritime technologies. Insufficient investment to take maritime innovation to the market remains a problem.

This Blue Growth approach aimed at supporting on their way new technologies and sectors that had not yet made their mark on the maritime economy. The need to meet CO_2 emissions targets, increase resource efficiency and reduce the environmental footprint of the blue economy has been a significant driving force for innovation in other sectors such as marine equipment, shipbuilding, ocean observation, dredging, coastal protection and marine construction. Considerable support from EU research and investment programmes for Blue Growth innovative projects has contributed to this progress.

An agenda to mobilise market forces

From the very outset, action on Blue Growth did not rely on regulation but on enabling market forces, by removing those barriers and market failures that prevent innovation and investment. The Commission initiated a number of successful facilitating or 'enabling' actions. Cutting 'red tape' and making administrative processes efficient has significantly reduced bureaucratic barriers for investment in aquaculture. Making marine data publicly available through an EU-funded open network has multiplied the opportunities for innovative business and science as well as making

licencing procedures more efficient. An EU programme to improve maritime skills and qualifications will help maritime businesses find urgently needed staff. An EU directive, accompanied by an EU-funded cooperation programme, has made cross-border maritime planning and the streamlining of permitting procedures for large projects a realistic prospect for the first time. Many more instances of pragmatic actions close to the market have helped the maritime economy evolve.

A research and innovation agenda for Blue Growth

The 2014-2020 EU research programme (Horizon 2020) changed the way that marine and maritime research was done. Compared to previous EU research programmes, more effort has been devoted to creating opportunities for previously separate strands of marine and maritime research to work together, for shifting research from the laboratory to the marketplace and for teaming up with non-EU countries sharing a common sea-basin. In the years 2014-2016, a total of EUR 800 million were allocated to marine and maritime research and innovation projects (more than EUR 260 million a year).

Some progress on investment in the blue economy

Investment in the maritime economy has been provided by EU structural funds, in particular the European Regional Development Fund and the European Maritime and Fisheries Fund (EMFF). Approximately EUR 275 million from the EMFF were set aside to be managed by the Commission for maritime policy projects (so-called direct management). Those funds were targeted specifically at maritime priorities and needs and have played a considerable and decisive role in piloting the Blue Growth strategy. The European Regional Development Fund also offers many openings for investment in the blue economy through its support to innovation, small businesses and reduction of greenhouse gas emissions. It is up to local authorities and businesses to take advantage of these opportunities.

Access to finance continues to be a challenge for many of the blue economy actors. Especially high-potential but risky ventures find it difficult to obtain sufficient investment funding. The Investment Plan for Europe is here to help. It has supported large projects such as offshore wind or port development but has not yet reached smaller, less well-established industries which investors are less accustomed to. The gap between the funding of research, which EU programmes cover well, and investment for market entry remains an issue. Setting up suitable investment vehicles to close that gap and to blend much-needed investments from private and public sources and to boost investment in the blue economy will remain a priority.

A collaborative and inclusive approach

The partnership approach advocated since 2012 has been instrumental in identifying and resolving problems. The engagement of business and industry and the full involvement of relevant actors in civil society, at all levels, have been essential: they have helped put Blue Growth in motion. The Commission initiated private-public fora, such as the “Ocean Energy Forum” or the "Blue Economy Business and Science Forum" bringing together industry, finance, academia and public authorities to identify practical solutions and make investment more attractive.

In the same vein, the sea-basin strategies (in the Atlantic Ocean, the Baltic and the Adriatic and Ionian Seas) and other regional initiatives (for instance in the Mediterranean, the Black and North Seas) have been bottom-up vehicles to trigger regional cooperation and to direct funding from the

EU funds (mainly the ERDF) towards the blue economy. Results have been achieved but they have been uneven. Funding issues still remain. But beyond them, the readiness of the Member States and their regions to take responsibility and be involved in these processes of cooperation will be decisive. The will to cooperate, to find solutions to common challenges and maximize common assets exists. The Commission will facilitate a shift from words and processes to results and actions.

Healthy seas for a sustainable Blue Growth

It is crucial that, in our quest for natural resources and economic growth, we do not repeat the same mistakes on sea as we did on land. Blue Growth is still in its early stages. Our responsibility today is to make sure that maritime economic development leads to a sustainable and competitive blue economy.

The widespread acceptance of the ocean economy and Blue Growth ideas has moved them up the international policy agenda. At the Rio+20 Summit, for the first time, the conservation and sustainable use of the oceans were addressed along with the world's other most pressing sustainability challenges. One of the Sustainable Development Goals which followed up the Summit is to conserve use the oceans, seas and marine resources sustainably (SDG 14). The EU committed to this approach. It is determined to turn these commitments into action and to be at the frontline in improving the way oceans are managed, reducing human pressures on our oceans and investing in science. This will ensure that marine resources are used sustainably, for healthy marine eco-systems and a strong blue economy.

1 INTRODUCTION

In 2012, the European Commission formulated its Blue Growth strategy to harness the potential of Europe's oceans, seas and coasts for growth and jobs[1]. At that time, the EU was still dealing with a difficult post-financial crisis situation. The short-term economic outlook remained fragile and unemployment was expected to remain very high[2].

Yet Europe's seas, coasts and maritime sectors and regions were considered to be drivers for the European economy, with a potential of 5.4 million jobs and a gross added value of just under EUR 500 billion per year.

The objective of the Blue Growth strategy was to promote smart, sustainable and inclusive growth and employment opportunities in Europe's maritime economy.

The strategy was endorsed in October 2012 at ministerial level through the Limassol Declaration[3]. The European Parliament expressed its support[4]. And as a follow-up, in May 2014, the Commission tabled a Communication on innovation in the blue economy[5].

In parallel, a new, reformed Common Fisheries Policy was agreed in 2013 and has been implemented since. It aims to support the traditional European fisheries sector by making fishing sustainable and thereby improving the economic and social situation of fishermen in the Union. The EU fishing fleet has moved from a loss-making position in 2008 to high profitability today[6]. This trend towards better economic performance, which is correlated to more sustainable fishing, has been reinforced and accelerated under the new Common Fisheries Policy.

Moreover, alongside the well-established opening-up of transport markets and the creation of the Trans-European Transport Network, the need for cleaner shipping has more and more come into focus. International and European requirements were adopted. The 'sustainable mobility' model is seeking to address the constant rise in greenhouse gas and sulphur emissions from the transport sector, which threatens to jeopardize the Union's efforts to achieve its climate goals. The Commission has also put efforts in the development of ports and related sectors with the aim to enhance their competitiveness and capacity to generate value and employment in Europe.

In the broader maritime economy, the Commission's logic since 2013 has been to:

---

1 Blue Growth – Opportunities for marine and maritime sustainable growth, COM(2012)494

2 Commission Staff Working Document "European economic forecast – Autumn 2012" ISBN 978-92-79-22855-1

3 https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/body/limassol_en.pdf

4 http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A7-2013-0209&language=EN

5 "Innovation in the blue economy: realising the potential of our seas and oceans for jobs and growth", COM(2014)0254

6 2016 Annual Economic Report on the European Union Fishing Fleet: Revenue in 2014: EUR 7.3 billion; net profit in 2014: EUR 770 million.

- push for sustainable growth in the maritime economy, with a particular focus on five sectors: energy, aquaculture, tourism, biotechnology and marine mineral resources . These sectors were selected because of their innovation and jobs creation potential;
- underpin growth by working on key "enablers" such as data and information, research, spatial planning, skills, environmental protection and maritime surveillance. These 'enablers' are common prerequisites for the maritime economy to thrive;
- tackle market failures and bottlenecks that require public intervention to create better conditions for innovation and allow the maritime economy to develop;
- mobilise EU funding instruments to support the development of Blue Growth;
- encourage and promote partnerships in regions, between Member States and non-EU countries, public authorities and economic players, in order to foster scale effects and mutually reinforcing learning and investment; and
- explore market opportunities worldwide for the international dimension of the blue economy.

Looking to 2030, many ocean-based industries have the potential to outperform the global economy as a whole, both in terms of value added and employment. The output of the global ocean economy is estimated at EUR 1.3 trillion today and this could more than double by 2030[7]. The EU has made clear that it should not miss this opportunity[8].

This report examines what has been learnt and what has been achieved since 2012, what is ongoing and what is still missing.

7 The Ocean Economy In 2030 © OECD 2016

8 Joint Communication "International ocean governance: an agenda for the future of our oceans" JOIN(2016)49 and A Global Strategy Of Foreign and Security Policy ("Shared vision, common action: A stronger Europe") June 2016

2 PUSHING FOR GROWTH IN FIVE FOCUS AREAS

Already in 2012 the employment landscape was changing. Globalisation, technological advance and the need to take action against climate change were altering the nature of traditional maritime industries and creating new ones. Five sectors were selected for special attention because there was a limited understanding of the bottlenecks that prevented them from fulfilling their potential. With this knowledge the Union could decide on the steps that needed to be taken to ensure the ocean's ability to sustain future generations.

The approach was tailored to the specific bottlenecks and market failures in each sector.

- For **ocean energy**, EU research programmes and EU structural funds have supported both fundamental research and near-to-market demonstrators. The Commission launched a joint private-public process (the Ocean Energy Forum) to analyse market failures and design action. Working in partnership, the maritime industry and public authorities developed an Ocean Energy Strategic Roadmap that, for the first time, sets the course for investment support, risk management, standards and risk-based public authorisation processes. The challenge now is to implement this roadmap.
- For **aquaculture** the emphasis has been first on collaborative work with national administrations to cut administrative red tape at national level which has hampered investment and growth, and second on promoting the value, quality and sustainability of EU products. Some more fundamental inquiries are now beginning such as how the oceans could feed a growing world population.
- For **maritime tourism**, the challenge was to support regional cooperation in order to create joint products such as nautical or cultural routes and create higher-value jobs without harming the marine environment.
- For **blue biotechnology,** a high risk, high reward sector that builds on investment in curiosity-driven research and on high-technology spinoffs, the initial focus was to use EU research programmes to support research and development and create momentum for pre-commercial ventures closer to the market.
- For **seabed resources**, several challenges were addressed in parallel: to develop a coherent EU resources strategy compatible with the goal of a circular economy; to advance research and technological development for the extraction of mineral resources from the deep sea; and to protect the fragile deep-sea environment from harm. The EU is among those providing considerable support to the International Seabed Authority by conducting research and developing of a strategic environmental plan for the Atlantic.

2.1 BLUE ENERGY

2.1.1 Offshore wind energy

Offshore wind is the fastest growing activity in the blue economy. Wind is steadier at sea than on land, so the average capacity factor is higher[9] and the disturbance to cherished landscapes less. The installed offshore wind energy capacity is therefore increasing in the shallow waters of Europe's northern seas. The European Investment Bank has helped finance about two thirds of them. As of January 2017, 12,631 MW of capacity was connected to the grid10. The EU is a global leader with about 90 % of the newly finished projects in the world, with the champions being the UK, Germany and Denmark[11].

The main challenges are first to reduce costs still further, and here regional cooperation can make a substantial contribution, second to develop reliable floating turbines and third to improve consenting procedures.

According to a recent study[12], running cables in an integrated grid rather than from each wind farm to shore separately could result in substantial savings for countries around the North Seas. In response to this challenge, the coordinated development of offshore grid was one of the main areas agreed for cooperation in a declaration on energy cooperation in June 2016 between countries from this region - Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Norway and Sweden. The United Kingdom joined in November 2016. The other areas for cooperation are maritime spatial planning, finance, standards, technical rules and regulations. This North Seas countries energy cooperation will also result in a better integration of the regional electricity markets and a more efficient use of available space.

It is estimated that 80% of the EU's wind resource are in waters too deep for traditional fixed turbines. Floating turbines could extend the deployment to deeper waters such as those off the Iberian Atlantic coast or the Mediterranean. A 2 MW pilot Windfloat project in Portugal has already proved the concept and a second wind farm with three 8 MW turbines is at an advanced stage. Finance from EU instruments including the NER300 programme for innovative low-carbon projects, Horizon 2020, the Knowledge Innovation Community 'InnoEnergy' and the European Investment Bank are contributing. More projects are being planned.

It is essential to coordinate with other sectors such as fisheries, transport, fossil energy extraction, etc. and to reduce administrative obstacles to the deployment of wind turbines in cross-border areas. Environmental assessments are needed not only to ensure cost-effectiveness but also to guarantee compliance with environmental standards.

---

9 The capacity factor measures the ratio of its actual output over a period of time, to its potential output if it were possible for it to operate at full capacity continuously,

10 Source: WindEurope.

11 Vázquez Hernández C. et al. JRC Wind Energy Status Report 2016 Edition

12 Study on regulatory matters concerning the development of the North Sea offshore energy potential, January 2016 ISBN: 978-92-79-57246-3

2.1.2 Ocean energy

Ocean energy is largely derived from the power of currents, tides and waves and to a lesser extent also from thermal and saline gradients in some locations. The resources are plentiful and the regular nature of their power delivery complements more variable renewable sources such as wind and sun. Estimates suggest that ocean energy could meet 10% of the EU's electricity demand by 2050[13]. The Carbon Trust estimated its total value to be approximately EUR 575 billion, cumulative and undiscounted, between 2010 and 2050. Europe is currently the technology leader in this emerging market. Other nations, including China, are positioning themselves to capture the renewable energy market[14].

Incentives from the public sector have helped enable certain renewable energy technologies to increase their competitiveness vis-à-vis conventional generation capacity. Since ocean energy is in an earlier stage of evolution, it will need the incentives for some years still.

A technological and commercial challenge remains to take the last steps towards building reliable and cost-effective devices in a challenging sea environment and make the capital investment pay off. After considerable effort, in the last four years by the Union, national governments and the growing ocean energy industry, a new generation of ventures is getting ready for commercial deployment.

Until now, the Union's support has concentrated on advancing technological development and readiness. In the last 10 years, EU research programmes have provided some EUR 150 million in funding for ocean energy research, development and innovation projects. Funding from Horizon 2020 was increased compared to the previous Seventh Research Framework Programme. A number of demonstration devices are being supported by NER 300 with EUR 142 million for 6 ocean energy projects and by Horizon 2020 which also helps enterprises access research infrastructure.

For the commercial deployment of those technologies, like for most renewable energies, the upfront costs and capital needs of ocean energy are high. What has been missing until now is sufficient investment to take those innovative technologies to the market. Existing EU funding instruments have not tackled this challenge sufficiently so far. Mobilising investment into innovative ocean energy ventures with a large growth potential remains the main challenge for the future.

As a follow-up to its Communication on Blue Energy[15] adopted in January 2014, the Commission established the Ocean Energy Forum to bring together industry and public authorities, identify the kind of concrete support needed and draw up actionable blueprints. The Ocean Energy Strategic Roadmap finalised by the Forum in November 2016 gives a clearer understanding of the remaining challenges and necessary steps. The Forum proposed four actions and gave recommendations that define the role of different players in the process.

---

13 Ocean Energy Strategic Roadmap: Building Ocean Energy for Europe

14 http://ieefa.org/ieefa-report-china-set-dominate-%E2%80%A8global-renewable-energy-boom-expands-lead-u-s/

15 Communication 'Blue Energy Action needed to deliver on the potential of ocean energy in European seas and oceans by 2020 and beyond', COM(2014)08

- A European phase-gate scheme has to be established to validate sub-systems and early prototypes in the less mature ocean energy technologies; after recognition by all stakeholders (from industry and research organisations to government and agencies) funding resources should be aligned with this phase-gate scheme.
- A public-private investment support fund should be established to finance start-up capital needs.
- An insurance and guarantee fund should help cover the risk associated with deploying a new technology.
- Studies, research and actions on environmental consenting should help de-risk consenting procedures and allow the use of best practice and experience between Member State authorities. This will reduce red tape for these novel renewable energy devices.

To implement the first three actions, the Union, its Member States and the industry would have to channel public and private funding to the ocean energy sector during the critical demonstration and pre-commercial phases and make effective use of financial instruments.

Unlocking the potential is also about de-risking the public consenting processes. As the first commercial projects are bearing all the risk of obtaining public consents, one of the core challenges is also to gather data and knowledge on environmental impact. To support this effort concretely, the Commission will launch a call for proposals in 2017 that will provide grants for environmental monitoring programmes.

2.2 AQUACULTURE

Worldwide aquaculture production volume has been expanding at a rate of about 6% a year in the last decade. Today it accounts for more than 50% of seafood production[16]. In the EU, it is responsible for about 20% of the EU's fish production and directly employs some 80 000 people. The volume of production has remained relatively constant over the same period whilst the value of production has grown by over 40%.[17]. Virtually all EU aquaculture produce is consumed within the domestic EU market and meets high quality, sustainability and consumer protection standards. These factors give seafood farmed in the EU an added value for consumers concerned about fresh, healthy and sustainable choices. Blue Growth places an emphasis on these aspects to support a leveraging effect, particularly for niche markets with a focus on local products, traditional methods and high value species and products. The objective is to have a competitive EU industry which can continue to grow sustainably to meet the growing demand for seafood.

The EU aquaculture agenda was set in 2013 with the publication of the Commission guidelines on the sustainable development of EU aquaculture[18]. These guidelines tackle barriers to profitability and growth through four main actions: (1) administrative simplification, (2) improving access to space and water, (3) increasing competitiveness and (4) exploiting the sustainable practices of EU aquaculture and high quality products.

16 FAO The State of World Fisheries and Aquaculture (SOFIA) 2016
17 Eurostat 2016: http://ec.europa.eu/eurostat/data/database
18 Communication "Strategic Guidelines for the sustainable development of EU aquaculture", COM/2013/0229

The procedures and rules governing the licensing and operations are put in place and implemented by national and regional authorities. Blockages caused by these procedures and rules are being tackled through working together with the national authorities. It aims to ensure that EU standards are understood and implemented as efficiently as possible without hindering development of the sector with unnecessary complexities. For instance, it contributed to the 2016 document on the application of the Water Framework Directive and the Marine Strategy Framework Directive to aquaculture[19]. The Aquaculture Advisory Council, established in 2016 and consisting of representatives from the aquaculture industry sector and other stakeholders, will further strengthen this cooperation.

In 2015, many countries announced actions to encourage growth in this sector as part of their multiannual national plans for the sustainable development of aquaculture. Portugal is considering adopting a single law for aquaculture; Italy is developing specific guidance for regions on environmental impact assessment and on allocation of zones for aquaculture; the United Kingdom adopted a toolkit for potential aquaculture farmers; Spain is finalising a framework law for the autonomous regions and is conducting a nationwide schools project inspired by the 'Farmed in the EU' campaign, with other counties ready to follow suit; Ireland launched a review of its licensing system. Greece and Italy have revamped their online registers of aquaculture facilities. Succinct summaries of each of the plans in the original language and English are published on EU Aquaculture Online[20], the single entry point website for aquaculture-related issues. An initial review of progress of Member States aquaculture plans will be explored through technical seminars in 2017.

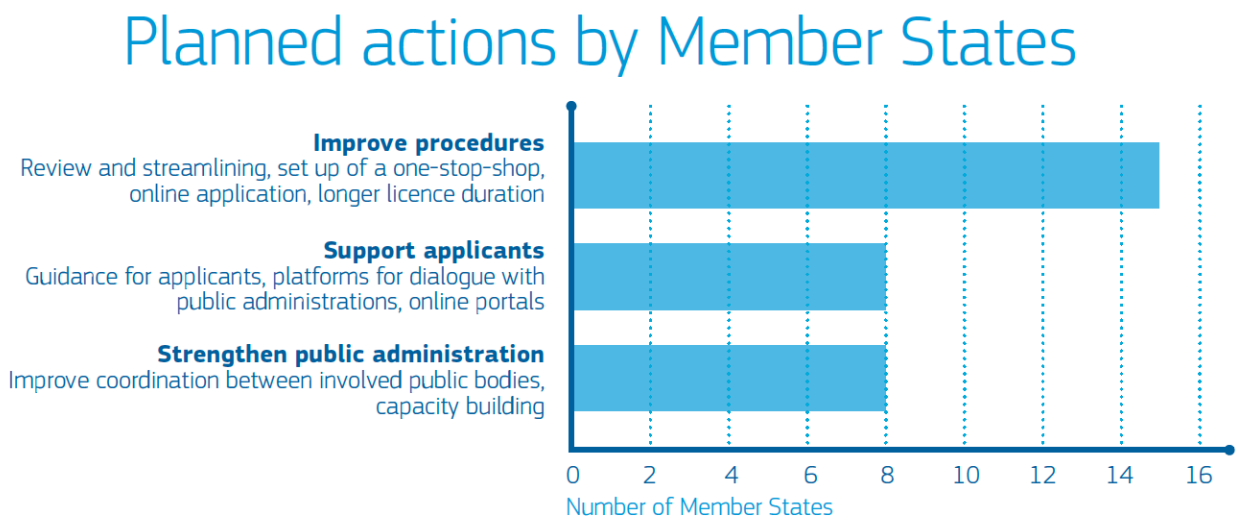

Figure 1 Some of the planned actions announced by Member States in their multiannual plans for aquaculture to reduce administrative burdens.

The European Maritime and Fisheries Fund has earmarked EUR 1.2 billion for the sustainable development of EU aquaculture (representing 20% of the Fund's 2014-2020 budget). The Fund can provide investment needed to modernise the sector. This can finance equipment for higher

[19] https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/swd-2016-178_en.pdf
[20] https://ec.europa.eu/fisheries/cfp/aquaculture/multiannual-national-plans_en

productivity, provide staff training, improve the environmental footprint of activities, provide environmental services, and buy stock insurance. In 2016-2017, Horizon 2020 has also invested EUR 46 million in research on aquaculture management, spatial planning and diseases and provided access to research infrastructure with a special focus on the Mediterranean. Such funding can de-risk private investment and make investments more attractive. Projects in the next cycle of funding will focus on large-scale demonstration of commercial feasibility for offshore and biorefinery projects.

Additional efforts on communication, by working directly with Member States on the 'Farmed in the EU' campaign will be needed. The aim of the campaign is to increase public awareness about aquaculture in the EU and communicate to people that the food they buy has been produced to high environmental and social sustainability standards.

Poor public perception of aquaculture is a factor which causes difficulties in granting new licences and increasing production. Encouraging more transparency by developing common technical standards would ensure a high level of environmental protection and facilitate investments across Member States. Scotland is a good example of a technical standard developed together with industry and non-governmental organisations (NGOs) to prevent escapes. The Commission intends to facilitate cooperation between Member States, the industry and NGOs to develop common technical standards.

There is a general consensus that more growth is also possible by moving further offshore where there is less competition with other activities. Studies supported by EU research programmes[21] indicate the feasibility of sharing infrastructure with other facilities, particularly offshore wind turbines, but so far no investment has been forthcoming. Mobilising investment in that potential growth sector - still missing today - is one of the main challenges ahead.

At the same time, the Commission has launched a longer term reflection on how the oceans could account for more than the current 2% of human food intake in a way that does not jeopardise their use by future generations, given that about half of the annual primary production of organic material occurs there[22]. Aquaculture's potential contribution is considered within the FOOD2030[23] process. Fish by-products processing for food and food ingredients, the potential of new algae value chains for food and consumer acceptability of aquaculture products, including algae, are covered by EU's research and innovation activities[24]. The Commission's Scientific Advice Mechanism High Level Group[25], backed up by Europe's science academies, will deliver an opinion on the ocean's potential for sustainable food supply by the end of 2017.

---

21 For instance MERMAID under the Seventh Framework Research Programme and MARIBE under Horizon2020

22 'Marine sustainability in an age of changing oceans and seas' Report by the European Academies' Science Advisory Council (EASAC) and the Joint Research Centre (JRC) of the European Commission EASAC policy report, 28 January 2016

23 http://ec.europa.eu/research/conferences/2016/food2030/index.cfm

24 http://ec.europa.eu/research/conferences/2016/food2030/index.cfm?pg=workshops

25 https://ec.europa.eu/research/sam/index.cfm?pg=hlg

2.3 COASTAL AND MARITIME TOURISM

The coastal tourism industry is by far the largest employer in the blue economy. 21% of the EU's population live in coastal municipalities[26]. Although they make up only 15% of the land area of the European Union, 47% of all nights in paid accommodation are spent there. The industry offers good opportunities for new entrants to the labour market – the proportion of young people is higher than the average in the blue economy – but the work is often temporary, seasonal and poorly paid. Reducing precariousness and increasing the number of high value jobs are therefore the primary objectives of the Commission's 2014 strategy for coastal and marine tourism[27] whilst at the same time reducing tourism's environmental footprint.

Many of the needs, for instance in training and skills development or visa requirements are identical to those for the tourism industry in general. The Commission's work on coastal and maritime tourism has therefore focused on concrete deliverables adding value to activities with a particular maritime angle. These include:

- Nautical tourism – the industry is growing rapidly. For instance, in Italy, 32 of 34 new port structures created between 2000 and 2007 were for tourism. Marinas feature in a number of operational programmes of the European Regional Development Fund and in 2016 a call for proposals to set up new transnational nautical routes was opened under the European Maritime and Fisheries Fund. The Commission has analysed the barriers to mobility of professional skippers of recreational craft, as well as the variations in safety requirements. Mutual recognition is the next challenge ahead[28].

- Cruise shipping: After the Caribbean, Europe is the world's second largest cruise ship destination. Port-of-call passenger visits have risen by 22% over the 2009–2014 period, growing from 23.76 million to 28.96 million[29]. An industry dialogue process between cruise operators, their destinations and cruise ports was started in order to safeguard the attractiveness of European destinations.

- Underwater cultural heritage – shipwrecks or settlements – are threatened by increasing offshore human activity. Yet they are not only an irreplaceable record of European history and prehistory but also a valuable attraction for tourists. The Commission is working with UNESCO on this. The European Maritime and Fisheries Fund also funds three projects on thematic underwater cultural heritage routes in the Adriatic, Mediterranean and Black Seas. These projects started in early 2017.

Community-Led Local Development (CLLD) has been implemented under the European Maritime and Fisheries Fund since 2014. Coastal tourism projects represent a substantial part of the EUR 500 million available for CLLD.

---

26 Municipality with a coastline or that has more than 50% of its area less than 10km from the coast.

27 Communication of the Commission 'A European Strategy for more Growth and Jobs in Coastal and Maritime Tourism', COM(2014)086

28 The Commission is preparing a Staff Working Document on nautical tourism (to be published in spring 2017).

29 Contribution of Cruise Tourism to the Economies of Europe 2015 Edition

- Fisheries Local Action Groups (FLAGs) support projects identified by partners in the framework of a local development strategy adapted to the specific features of their local area.
- Pescatourism or fishing tourism – this is a key area for many FLAGs who have helped local fishermen with the investments needed to take tourists on board. This has helped diversify their activities and reduce the pressure on stocks.
- Another key area is the promotion of the local catches in restaurants and hotels. This allows local fishermen to obtain better value for their catches, reducing the need to catch large volumes.
- Many more innovative projects have been supported to take advantage of local features. For instance, the 'put and take' recreational fishing project in Jutland (Denmark)[30] offers an easy way for families and friends to experience sea fishing in a safe and accessible environment where, in addition, the catch is guaranteed.

2.4 BLUE BIOTECHNOLOGY

The variety of marine organisms, which is greater than on land, can support the development of new products for the benefit of society. Marine biotechnology (blue biotechnology) uses resources from living organisms at sea either as a source or as a target of biotechnology applications. This vast field covers knowledge and tools from fields such as molecular biology, genomics, proteomics, metabolomics, cell biology and physiology or ecology to render applications to food (aquaculture), human health and wellbeing (anticancer drugs, pain killers, antibiotics, cosmetics, or nutraceuticals),conservation (habitat restoration or bioremediation of marine ecosystems) and new industrial products and processes (enzymes, biopolymers, biomaterials or algae biorefineries).

But the development of marketable products, particularly for pharmaceuticals, is a long-term serendipitous process which, in the initial stages, is almost entirely based on publicly funded research. Small companies, typically attached legally or geographically to universities, may then investigate promising findings. Only after further encouraging results do the larger pharmaceutical businesses, who have the means to support the lengthy clinical trials and marketing that follow, step in. The pre-clinical pipeline supplies several hundred novel marine compounds every year and those continue to feed the clinical pipeline with potentially valuable compounds. As of April 2016 there were 15 compounds in phase 1 clinical trials in the USA, 10 in phase 2 and 3 in phase 3. 7 are approved for clinical use, 4 of which to treat cancer. From start to finish the process takes an average of 17 years.

A specific report[31] launched by the Commission to look into marine products derived from marine organisms found that most products on the market were used in cosmetics, food supplements and aquaculture. Work is in progress on algal biofuel which is seen as a long-term solution with less collateral environmental or societal impact than first generation biofuels. Nevertheless, the maritime sector already contributes to Europe's industrial biotechnology sector, as found by a

[30] https://webgate.ec.europa.eu/fpfis/cms/farnet/%E2%80%9Cput-%E2%80%98n%E2%80%99-take%E2%80%9D-recreational-fishery-flag-west-jutland-dk

[31] https://webgate.ec.europa.eu/maritimeforum/en/node/3599

recent survey of almost 450 experts involved in biobased research, industry and governance[32]. Industry respondents were asked about the source of their feedstock and 7% reported using marine biomass, including microalgae and macroalgae. The overall market worldwide for bio-based applications of blue biotechnology, is estimated to reach over EUR 6 billion by 2025[33].

Granting access to the genetic material and sharing of benefits accruing from applications based on this material with those in the area where they were found have become enshrined in international law. Since the entry into force in 2014 of an EU Regulation[34] to comply with the Nagoya Protocol, researchers in Europe must track material as it moves from laboratory to laboratory and organism to organism over many years. This is so that the source can be traced in the highly unlikely event that its genetic material is incorporated in a marketable product. A study for the Commission[35] highlighted researchers' concerns that bureaucracy could hamper innovation. Unlike for seafloor mineral resources, there are currently no international rules on access and benefits beyond areas of natural jurisdiction. An ad-hoc open-ended Informal Working Group of the United Nations General Assembly is identifying what can be done.

The EU has provided considerable support to the process by which derivatives of marine organisms are developed and tested for beneficial applications. In the 2007-2013 Seventh Framework programme for research, EUR 164 million were spent on 28 separate projects. In its successor Horizon 2020 programme, EUR 26 million have been allocated so far to five different projects, focusing on marine biomolecules, industrial biomaterials, enzymes, integrated algae biorefineries etc. In addition, Marie Skłodowska-Curie actions have provided grants allowing researchers to move between laboratories looking at these issues. In parallel, the Biobased Industries Joint Undertaking (BBI JU) is a public-private partnership mechanism that also provides funding opportunities for blue biotechnology innovation. This targeted work depends on a continuing supply of results from exploration, sampling and basic research. Access and benefit sharing processes need to be as bureaucratically painless as possible. Progress can be accelerated through collaboration and sharing of resources and data. For instance by using bioinformatics tools to screen sequences and their expressions. The European Marine Biological Resource Centre (EMBRC) promotes this collaboration.

To strengthen Europe's competitive position in the emerging bio-economy, the European Maritime and Fisheries Fund will support the set-up of a marine bio-economy forum in 2017. It will bring together industry, public authorities, academia and finance to propose concrete solutions for bringing marine bio-tech products sooner to the market.

PharmaSea
The PharmaSea project focused on overcoming obstacles in marine biodiscovery research, development and commercialisation of new molecules. The results include the creation of a library of marine microbes

[32] Hodgson E, Ruiz-Molina ME *et al*. (2016) *Horizon scanning the European bio-based economy: a novel approach to the identification of barriers and key policy interventions from stakeholders in multiple sectors and regions* Biofuels, Bioprod, Bioref 10: 508-522 doi: 10.1002/bbb.1665

[33] Smithers Group *The Future of Marine Biotechnology for Industrial Applications to 2025* (2015), quoted in Hurst D, Børresen T *et al.* (2016)

[34] Regulation (EU) N°511/2014 of the European Parliament and of the Council of 16 April 2014 on compliance measures for users of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization in the Union.

[35] https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/Blue%20Biotech%20-%20Final%20Report%20final.pdf

out of more than 3000 isolates (89 of which with relevant chemical or pharmacological activity), 28 genomes and more than 300 biochemical pathways, most of them leading to unknown structures. The project also developed novel improved methods for extracting, testing and fermenting. Two new compounds have been tested on animals for anti-Alzheimer's activity, and one of them is already considered a drug lead. Policy-wise, the project issued recommendations to improve access to marine bioresources in diverse habitats and jurisdictions within current legal frameworks such as the Nagoya Protocol. PharmaSea project has also received the CommNet Impact Award for engaging citizens

2.5 SEA BED MINERAL RESOURCES

In addition to oil and gas, extraction in European waters is presently made up of aggregate extraction for construction and beach nourishment together with shallow coastal water mining for other minerals such as potash. However, the Commission's main focus has been on the deep sea where commercial interest is increasing: partly because of concern about reliable sources of minerals for European industry, partly because of concerns about potential harm to the untouched and fragile deep-sea environment, and partly because there is widespread belief that technology for extracting minerals with the minimum ecological disturbance is too large a task for each EU country to develop and test on its own.

A public consultation[36] showed widespread support from all quarters for research on the issue to be included within EU research programmes. The exploitation of marine mineral resources requires particular attention. There is emerging evidence that the areas with the highest biodiversity in deep-sea areas, such as the Clarion-Clipperton fracture zone in the Pacific, coincide with those richest in nodules and seamounts, where ferro-manganese crusts are found.

A study supported by the Commission[37] summarised the state of play on legal, economic, technological, geological and environmental issues in 2015. The economic viability, extraction technologies and environmental impact are different for each of the three types of deposit and need to be considered separately:

- metals crystallised on nodules on the abyssal plane
- metal sulphides exhaled from hydrothermal vents;
- ferro-manganese crusts, which are, like nodules, formed by precipitation from seawater, primarily on sea-mounts.

Exploration licences in the international Area require a sponsoring state. Belgium, France, Germany and the United Kingdom as well as a consortium including Bulgaria, the Czech Republic, Poland and Slovakia are sponsors for contracts for nodules, all in the Clarion-Clipperton zone. France sponsors sulphide exploration in the mid-Atlantic ridge and Germany in the Indian Ocean.

The International Seabed Authority is in the final stages of adopting rules that will allow extraction in the Areas beyond national jurisdiction. Because nearly all the proposed activity will take place outside areas where EU law directly applies, the EU cannot stipulate whether or not mining takes place. But it can support efforts to ensure that it is done in a way that respects EU values, for instance:

[36] http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/seabed-mining/index_en.htm
[37] https://webgate.ec.europa.eu/maritimeforum/en/node/3732

- EU research programmes contributed EUR 27 million on three major projects starting in 2013, 2014 and 2016 and research agencies from eleven countries contributed EUR 13.2 million for a joint effort under the auspices of the Joint Programming Initiative for Seas and Oceans[38]. New insights have already been gained on ecological impact, monitoring technology and recovery once operations have ceased. The issues depend very much on the type of deposit, the ecosystems and the areas likely to be affected, which are very different. Mining of nodules could cover 120km^2 per year whereas mining the Solwara 1 sulphide mining area of 1km^2 will take about 2 years.
- The EU has supported initial work to define Areas of Particular Environmental Interest in the mid-Atlantic ridge. This has already been done for the Clarion-Clipperton zone in the Pacific. The aim is to support the creation of a network of sites that would be protected as unique marine ecosystems by limiting potentially disruptive human activity. The process, which is similar to a strategic environmental assessment, will be reinforced in 2017 and consider all current and potential activities and resources. The aim is to present the results of this work to the International Seabed Authority to help implement the extraction rules once they have been adopted.
- If mining takes place in the waters of developing nations, the EU can help local communities share in the benefits. The EUR 4.4 million DSM Project[39], started in 2011, has been helping Pacific island countries to improve the governance and management of their deep-sea minerals resources.
- The EU is among the technology leaders in developing deep-sea mining technology. This offers the chance of influencing deep-sea mining globally to the benefit of the environment, by leading the way in developing low-impact technologies.

These efforts have improved communication between researchers, national authorities, the industrial sector and civil society. This increased transparency has greatly contributed to the EU's objectives for better ocean governance and will continue to be a priority for the Commission.

[38] https://webgate.ec.europa.eu/maritimeforum/en/node/4001
[39] http://dsm.gsd.spc.int/

3 ENABLING BLUE GROWTH

The benefits of marine data, spatial planning and maritime surveillance to facilitate growth in the blue economy had already been recognised in the Commission's 2007 proposal for an integrated maritime policy[40]. The 2012 Blue Growth communication also listed the Marine Strategy Framework Directive, the European transport space without barriers, education and skills development, and finance for investment, particularly for small and medium enterprises, as key enablers.

3.1 MARINE DATA

Marine data are held by hundreds of public and private organisations in Europe. Making these data more interoperable and more available to users can improve the productivity of private industry, public authorities, researchers and civil society. It does this by obviating the need to resurvey areas where data already exist but are unavailable and by reducing the cost of putting data from different sources together. It can stimulate innovation because added-value services need no longer be provided only by the owners of data and because new services and products can be developed by compiling data from different sources that would not have been possible before. Finally, it can reduce uncertainty regarding the present and future state and behaviour of the sea and marine life. This, in turn, reduces investment risk.

The three main EU initiatives aiming to achieve these goals are:

- the Copernicus Marine Environment Monitoring Service which provides space data and oceanographic forecasts,
- the Data Collection Framework which supports the collection and processing of fisheries and aquaculture data and
- the European Marine Observation and Data Network (EMODnet) which assembles, processes and distributes all other marine data and data products.

The Copernicus Marine Environment Monitoring Service (CMEMS) provides full, free and open access to regular and systematic reference information on the state of the oceans and European regional seas based largely on satellite measurements of parameters such as surface temperature, ocean colour[41], sea surface height and sea ice as well as information from circulation models based on this information and measurements from instruments in the sea. These provide a description of the current situation (analysis), a prediction of the situation a few days ahead (forecast) and the provision of consistent retrospective data records for recent years (re-analysis). With a budget of up to EUR 144 million, Mercator Ocean, has been entrusted by the Commission to operate the service for the next six years, up until 2021. This does not include the cost of launching and operating the satellites themselves[42]

---

40 Communication "An Integrated Maritime Policy for the European Union", COM(2007) 574

41 Which gives an indication of chlorophyll which can allows phytoplankton or algae distribution to be mapped.

42 Where the EU pays EUR 3.4 billion over the seven years for monitoring both sea and land.

The Fisheries Data Collection Framework[43] lays down rules on what fisheries and aquaculture data needs to be collected by the Member States to support the provision of "best available scientific advice". The datasets comprise biological and economic data which is compiled in aggregated form by the International Council for the Exploration of the Sea and the Joint Research Centre and analysed by experts who provide the scientific advice. Funding is provided by the European Maritime and Fisheries Fund and allocated according to operational programs developed by the Member States and approved by the Commission. The EU contribution over the seven years of the programme will be EUR 520 million which covers 80% of the total expenditure.

EMODnet, which is also funded by the European Maritime and Fisheries Fund, has now developed a comprehensive and coherent digital map of the topography, geology and habitats of the seafloor as well as the physics, chemistry and marine life of the water column and distribution of human activities. This achievement is unrivalled elsewhere in the world. At the beginning of 2017 a third phase started that will improve resolution and increase the number of parameters available. For instance, by the end of 2017 it will offer access to harmonised data on the distribution of marine litter in seabeds, the water column and on beaches.

Up to now EMODnet has focused mostly on data held by public organisations. The 2014 roadmap[44] identified the need to involve industry more, in order both to assess their needs and to engage them in sharing their data. An expert group of representatives from industry is being set up and a 'data ingestion facility' to help safeguard and subsequently disseminate their data became operational in early 2017. EMODnet already includes partners from non-EU countries bordering European sea-basins. As part of the effort to improve international ocean governance, work will begin in 2017 to identify how data and data products from EMODnet can be linked to major efforts on other continents. This will contribute to meeting the objective set by the G7 science and technology ministers in 2016.[45]

A study that draws conclusions on the economic benefits of observation and mapping and an evaluation of EMODnet will be published before the end of 2017. This information, as well as results of stress tests on European marine data[46] and research projects[47] is feeding into EMODnet improvements and reflections as to what a truly integrated European Ocean Observing System should look like.

Better forecasts of storm surges
Coastal communities along the North Sea are regularly subject to storm surges, most catastrophically in 1953. Recent studies indicate that their frequency and severity will increase[48]. The UK Meteorological Office has adopted EMODnet as its standard model for sea bottom topography after finding that it made

[43] Council Regulation dated 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy, (EC)199/2008.

[44] Commission staff working document "Marine Knowledge 2020: roadmap accompanying the document Innovation in the Blue Economy realising the potential of our seas and oceans for jobs and growth" SWD(2014)0149

[45] G7 Japan 2016 Ise-Shima http://www.japan.go.jp/g7/summit/documents/index.html

[46] http://www.emodnet.eu/checkpoints

[47] For example the ATLANTOS project studies how to optimise and enhance Atlantic observing systems.

[48] Vousdoukas et al, 2016 Projections of extreme storm surge levels along Europe Climate Dynamics November 2016, Volume 47, Issue 9, pp 3171–3190

massive improvements to their forecast model. Better forecasts mean better preparedness and lower risk to life and property on the coast and offshore.

3.2 MARITIME SPATIAL PLANNING

Spatial planning is a tool for improving maritime governance in waters of EU countries. Evidence that it could increase the efficiency of licensing offshore activities whilst protecting the marine environment led to the adoption of Directive 2014/89/EU establishing a framework for maritime spatial planning (MSP). The Directive requires Member States to develop spatial plans but leaves it to their discretion how they should do so. It also requires them to cooperate across borders. Member States needed to transpose the Directive into their national legislation and nominate a competent authority by September 2016 and establish plans before March 2021. Together with the Marine Strategy Framework Directive[49], the MSP Directive is a foundation stone for the sustainable development of the EU's seas and oceans.

The greatest change in human activity on sea over the past decade has been the growth of the offshore wind industry. Spatial planning has contributed to the efficiency and speed with which this transformation has taken place.

Spatial planning to facilitate offshore wind energy development

- Belgium's new offshore wind farms provide approximately EUR 213 million in annual gross revenues[50]. Before Belgium adopted a North Sea master plan, offshore wind was opposed by local communities. This created additional costs: up to EUR 12 million for environmental assessments, site surveys, piloting, and more each time a permitting process failed[51]. In 2004, by contrast, after Belgium adopted its master plan, it successfully declared a wind energy development zone far from the coast, away from sensitive seafloors. When fully developed, the zone is expected to support 2400–3800 MW of installed wind capacity. Three of the zone's seven granted leases have already been developed.[52]

- The Netherlands has designated specific areas for offshore wind energy in the maritime spatial planning process. Within the designated areas, permission is available for the construction of wind farms that comply with the offshore wind farm regulations. The government regulates the exact location, consents, and the connection to the electricity grid as companies compete to receive a permit (through a public tender) to build and operate the wind farm. This has resulted in a cost reduction of EUR 2.3 billion over a 15-year period. Maritime spatial planning has helped to establish legal clarity, and therefore business is now less exposed to uncertainty. Administrative costs and time to grant permits, licences and certification have been reduced, and competition between companies has increased sharply.

---

49 Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive)

50 3E. Benchmarking study on offshore wind incentives: comparison of the systems in six neighboring countries; 2013. http://www.belgianoffshoreplatform.be/upload/attach-image/benchmarkingstudyoffshorewind20130326.pdf〉

51 J. Blau et al. Assessing the impact of a new approach to ocean management: Evidence to date from five ocean plans, Marine Policy, Volume 56, June 2015, Pages 1–8

52 Belgium Ministry for the North Sea. Marine spatial plan: annexes to the royal decree establishing the marine spatial plan. Brussels, Belgium: Belgium Ministry for the North Sea; 2014. http://www.health.belgium.be/filestore/19086906/Bijlage%201%20Ruimtelijke%20Analyse%20van%20de%20zeegebieden.pdf

To facilitate the implementation of the Directive, the Commission works closely with Member States through a dedicated expert group. In addition, an assistance mechanism[53] for Member States, was established by the Commission in 2016. It disseminates practical information on the implementation of MSP, brings together operational summaries of best practices for each requirement of the Directive, elaborates studies or technical briefs, facilitates workshops to foster cooperation and supports the exchange of best practices at sea-basin and EU level. The assistance mechanism includes Focal Points for the Baltic, North Sea, Atlantic, Western and Eastern Mediterranean and Black Sea that can answer queries concerning planning in these sea-basins at short notice.

Ensuring safe navigation or the protection of sufficient representative habitats in a given seabasin requires coherence between plans of neighbouring countries. While several cross-border planning exercises have been supported through successive INTERREG projects[54], the European Maritime and Fisheries Fund launched three calls for proposals for cross-border projects for a total amount of nearly EUR 18 million between 2014 and 2016. The aim is to support Member States in the launching of their maritime spatial planning processes and to establish structures for cross-border planning from the start. Improving the understanding of actions taken by neighbouring countries and developing common frameworks has contributed to avoid potential conflicts and build synergies. The Commission plans to continue this support through further calls for projects until 2020.

Maritime Spatial Planning projects

- *In the context of the MARSPLAN project. Romania and Bulgaria have developed a common approach to move the MSP process forward and as result the elaboration of a common maritime spatial plan for the cross-border area of Mangalia – Shabla is being developed*
- *The Simcelt consortium is developing a regional scenario, including analysis of future demands involving stakeholders for each sector. This will allow barriers and opportunities for maritime activities in the region to be developed including cross-border initiatives.*
- *Baltic SCOPE has conducted cross-border consultations for two case areas in the Baltic Sea to work on pertinent transboundary topics (shipping, energy, fishery, nature protection areas) in a systematic step-by-step approach. This enables the project to provide real planning solutions for transboundary issues and develop a template for dealing with similar issues elsewhere.*

The EU is leading the development on Maritime Spatial Planning worldwide: 46% of all MSP initiatives take place in the EU. In order to broaden the experience of cross-border cooperation and to promote spatial planning at a global level, the Commission has undertaken a study on international best practices and the development of an inventory of practices worldwide (to be published May 2017). Following the jointly organised 2nd International Conference on Marine/Maritime spatial planning in March 2017, the Commission's Directorate General for Maritime Affairs and Fisheries and the Intergovernmental Oceanographic Commission of UNESCO (IOC/UNESCO) adopted a "Joint Roadmap to accelerate Maritime/Marine Spatial Planning processes worldwide". The roadmap identifies common challenges and proposals for actions to be implemented in the coming years, reaching out for collaboration with other UN bodies and Member States. The Commission will work with all relevant actors to develop proposals for internationally accepted guidelines in order to promote the use of MSP and related processes by partner countries and at international level, in particular in the UN.

53 http://www.msp-platform.eu/

54 Overview of cross-border MSP projects: http://msp-platform.eu/msp-practice/msp-projects.

3.3 ENVIRONMENTAL PROTECTION AND THE MARINE STRATEGY FRAMEWORK DIRECTIVE

The Marine Strategy Framework Directive (MSFD) adopted in 2008[55] establishes a policy framework to address the challenges facing Europe's marine environment and to work towards a sustainable use of its marine resources. With the Birds[56] and Habitats[57] Directives, this Directive forms the environmental pillar of the maritime policy. They are at the heart of the EU's contribution to international efforts to protect marine environment.

Within the MSFD, the Member States will take measures to achieve or maintain good environmental status in the marine environment by the year 2020 at the latest. This is to be done by developing and implementing strategies that protect and preserve the marine environment, prevent it deteriorating or, where practicable, restore marine ecosystems in areas where they have been adversely affected.

The Directive has a six-year implementation cycle, beginning with an initial assessment of the status of the marine environment and ending with the adoption of programmes of measures. The deadline for reporting on those programmes was 31 March 2016, and so far 12 of 23 Member States have reported their programmes. A proposal for a revised Commission Decision on 'Good Environmental Status' is currently examined. It lays down more clearly the criteria and methodological standards that enable Member States to determine the good environmental status of their marine waters, thus allowing for a more consistent and coherent approach to reaching the objectives of environmental legislation. The objective is to set out a clear framework for economic operators, and ensure a level-playing field in terms of environmental expectations across the Union's marine waters. The reporting mechanism under the MSFD provides one of the means of observing to what extent the pursuit of Blue Growth is compatible with protection the marine environment.

The European Biodiversity Strategy[58] promotes the restoration of degraded ecosystems and their services. This will contribute to the Union's sustainable growth and help mitigate and adapt to climate change, in particular in vulnerable and highly populated coastal regions. It can strengthen fisheries industries, attract tourists, and increase real-estate value. The minimum costs of not adapting to climate change are estimated at EUR 100 – 250 billion for the EU as a whole[59]. Ecological restoration and adaptation of marine and coastal regions will contribute to reducing these costs and risks, and was outlined as an important contributing factor in the Paris COP

---

55 Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)

56 Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

57 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

58 Communication from the Commission to the European Parliament , the Council, the Economic and Social Committee and the Committee of the Regions, "Our life insurance, our natural capital: an EU biodiversity strategy to 2020" COM(2011)

59 COM (2013) 216 An EU strategy on adaptation to climate change

Agreement[60]. Recent US studies indicate the significant job creation potential of the "Restoration Economy": 17 -33 jobs created per million US dollars invested in coastal habitat or general ecological restoration projects – more than many other traditional industry investments[61] [62] [63]. There are a range of economic benefits of Marine Protected Areas[64]. Increasing marine protected area coverage to 30% could generate up to USD 920 billion between 2015 and 2050[65].

The Commission conducted a study on green jobs in the blue economy[66] in order to identify innovative ideas by local players to make existing business practices more environmentally compatible, develop new environmentally-motivated goods and services and identify any unintended obstacles in this area. It found environmentally-compatible activities were largely on a small scale and of a diverse nature locally. The widest range was in the northern and western parts of the Union. Most activities were still supported by public research money rather than private investors. The barriers encountered by these activities were sector-specific; few were found to affect multiple marine and maritime industries simultaneously.

3.4 SKILLS DEVELOPMENT

The need to better match available skills to labour market demand has been recognised for some time. The focus of shipbuilding on more specialised vessels, the growth in offshore renewables, the current downturn in the oil and gas industry and the evolution of new, innovative maritime businesses in many areas, all drive the requirement for promoting new skills and renewing the skills of those who work in the maritime economy. The 2013 'Leadership 2020' initiative[67] on shipbuilding highlights the need for mutual recognition of qualifications, transfer of competences between generations and convincing young people that the industry has a future. The industry association that monitors the labour market indicates that demand persists.[68] The same goes for other sectors: the increasing automation of ports, the need to comply with tighter environmental regulations on emissions and waste for shipping and the opportunity to take advantage of new insights in disease prevention for aquaculture all require new skills. Moreover the maritime industry has emphasised that the needs are not only for highly-specialised scientists and engineers but also for welders or electricians where the skills needed for constructing or maintaining reliable and safe floating, offshore or underwater machinery require specific training.

The innovation and entrepreneurship angle is being tackled by the European Framework Programme for Research and Innovation (Horizon 2020) and by Knowledge and Innovation Communities (KICs). KICs are partnerships that bring together businesses, research centres and

60 https://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf
61 Edwards et al. Marine Policy 28 (2013) 65-71.Investing in nature: Restoring coastal habitat blue infrastructure and green job creation
62 Todd K. BenDor et al, Journal of Restoration Ecology, March 2015, Defining and evaluating the ecological restoration economy.
63 https://www.americanprogress.org/wp-content/uploads/2014/04/CoastalRestoration_report.pdf
64 http://ec.europa.eu/environment/marine/eu-coast-and-marine policy/implementation/pdf/marine_protected_areas.pdf
65 http://ocean.panda.org/media/Living_Blue_Planet_Report_2015_Final_LR.pdf
66 Final report not available yet.
67 Leadership 2020 "The Sea, New Opportunities for the Future".
68 Evolution of Supply, Employment and Skills in the European Maritime Technology Sector Brochure 2016, SeaEurope, March 2016

universities. They allow innovative products and services to be developed, new companies to be started and a new generation of entrepreneurs to be trained. There is no KIC specifically devoted to marine or maritime issues. A 2014 study[69] reported that parts of the activities performed by the existing KICs (on energy, information technology and climate for instance) are relevant to Blue Growth. But it recommended additional attention be paid to the maritime dimension of the KICs. The European Institute of Innovation and Technology which manages the KICs will review its Communication Strategy in 2017 to ensure that lessons learned, novel practices and results from these KICs are made accessible to a wider community.

Among the broad range of actions set out in the 2016 "New Skills Agenda for Europe"[70] that aim to respond to this challenge is the 'Blueprint for sectoral cooperation on skills'[71]. Industry-led initiatives will deliver strategies to tackle skills gaps in selected sectors. The maritime technology sector will be one of the pilot sectors. The first step is to collect further evidence on skills gaps and their potential impact on growth, innovation and competitiveness and set up an industry-led EU platform. Stakeholders from different maritime technology segments and diverse geographical areas including maritime clusters, education providers, industry, social partners, employment services, certification bodies, standards bodies and governments will recommend how education and training can better reflect new trends and developments in the sector and meet the current and emerging needs of employers. The call to set up such European partnerships was launched in January 2017, under the Erasmus+ programme[72]. It is envisaged that the recommendations will be implemented at a national and/or regional level, with the support of the European Structural and Investment Funds.

In the meantime, the Commission's Blue Careers Initiative[73] will establish new platforms for cooperation between business, education and training at local, regional or transnational level to develop and implement concrete actions to close the skills gap, tackle the unemployment challenge, raise the attractiveness of 'blue careers' and increase ocean literacy. It covers both learners and trainees as well as those already working –inside and outside the blue economy. The Blue Careers call is funded by the European Maritime and Fisheries Fund and supports seven projects, covering both higher education and vocational training. The ResponSEAble and SeaChange projects[74], currently running under Horizon 2020, are engaging with citizens, formal education and policy actors as a first step to increase ocean literacy across Europe.

Finally, an expert group on skills and career development in the blue economy will be set-up in 2017. It will advise the Commission on issues such as enhancing mobility of students and trainers, strengthening cooperation between education and industry, boosting ocean literacy and raising awareness of career opportunities in the maritime sector.

---

69 https://webgate.ec.europa.eu/maritimeforum/en/node/3684

70 Communication ' A New skills agenda for Europe Working together to strengthen human capital, employability and competitiveness' COM(2016) 381 final

71 http://ec.europa.eu/social/main.jsp?catId=1223&intPageId=4320&langId=en

72 Through the Erasmus+ Sector Skills Alliance instrument, Lot 3

73 https://ec.europa.eu/easme/en/call-proposals-blue-careers-europe

74 http://www.responseable.eu/ and http://www.seachangeproject.eu/

3.5 MARITIME SECURITY

Improving cooperation among European public authorities responsible for carrying out various control activities to detect and react to illegal or dangerous activities at sea has been a goal of the European maritime policy from its outset in 2007[75].

Initial work focused on information exchange. Although communication channels between authorities from different countries were in some cases already in place, those authorities responsible for different activities (fisheries and cargo transport for example) were using mutually incompatible systems that ruled out any useful collaboration. Work started on defining a Common Information Sharing Environment (CISE) that would allow information to flow smoothly between the different authorities while respecting rules on protection of personal data and commercial confidentiality.

The EU Maritime Security Strategy adopted in June 2014 and its action plan adopted in December of the same year represented a quantum leap in the commitment of Member States. The Union developed them to address maritime security challenges effectively and comprehensively using all relevant international, EU and national instruments. It covers cooperation in a range of activities including and beyond surveillance and in waters outside Europe. Regional Strategies such as the European Union Strategy on the Gulf of Guinea or the European Union Strategic Framework for the Horn of Africa are examples of initiatives that are or could be developed in the future.

A major thread running through the actions proposed is the need for closer cooperation between civilian authorities (coastguards) and military authorities (navies), for example to make better use of military assets and information to improve the effectiveness of civilian operations. For example a military drone, radar station or patrol craft often have more advanced technologies which can be useful also for civilian purposes. A military radar could for example locate objects at sea, such as a missing airplane or migrant vessel, which could not be easily detected by civilian radars. A first implementation report was presented by the Commission in June 2016 and a second is scheduled for mid-2017. The mid- to long-term objective of this strategy will to continuously monitor the implementation process and gradually review and revise to action plan to focus and deliver on the political priorities of the EU.

A second major step was the legislation for European cooperation on coastguard functions adopted by co-legislators in September 2016[76] as part of the Border and Coast Guard package. These measures are a joint mandate for three sectoral EU agencies (the European Fisheries Control Agency –EFCA-, the European Border and Coast Guard Agency and the European Maritime Safety Agency –EMSA-) to cooperate and provide joint and integrated services to national authorities on information-sharing, the provision of information services, risk management, capacity building and multipurpose capacity sharing. This mandate enables the agencies to streamline and integrate their activities to avoid duplication (for example by integrating their information systems and services), provide better services to national authorities and provide joint services to national authorities.

---

75 Communication from the Commission - An Integrated Maritime Policy for the European Union COM(2007) 574

76 Regulation (EU) 2016/1624 of the European Parliament and of the Council 14 September 2016 on the European Border and Coast Guard and amending Regulation (EU) 6/399 of the European Parliament and the Council, Council Regulation (EC) N°2007/2004 and Council Decision 2005/267/EC.

The agencies will for example though EMSA provide a new drone capacity to national authorities which can be used by Member States for multipurpose surveillance. Close collaboration between Frontex and EFCA to synchronise their operational activities (EFCA can make use of Frontex patrol vessels or aircraft and vice versa) has for example led to a sharp increase in the number of sightings of potential illegal fishing activities in the Mediterranean Sea.

This interagency cooperation on coastguard functions will be further expanded in 2017 with additional resources provided. The agencies will also explore further areas for co-operation where synergies can be achieved through closer cooperation on capacity building activities with third countries such as in the Mediterranean Sea and other sea basins as appropriate where the agencies have until now supported capacity building activities separately. The general objective for future years will be to consolidate and further expand this collaboration to other areas where similar synergy effects can be obtained.

In the meantime, further work is being carried out to further develop interoperability solutions for the Common Information Sharing Environment (CISE). Member States are closely involved in this process through their participation in the 'EUCISE2020' project, which will be completed by 2018. By 2020 CISE-enabled voluntary operational information services should already have been tested and become operational.. To follow up on two calls for proposals under the European Maritime and Fisheries Fund already launched in 2014-2015, leading to ten national voluntary CISE projects already ongoing, an additional call for proposals will be launched in early 2017.

3.6 MARINE AND MARITIME RESEARCH

The current EU's research programme (named 'Horizon 2020') supports activities tackling excellent science, industrial leadership and societal challenges. It funds many projects for instance on the impact of climate change on ecosystems, ocean acidification, underwater robotics, maritime spatial planning, ocean observations, biotechnology, environment, food and ocean energy. EU spending on research that is related to seas and oceans totals about EUR 260 million per year.

Under Horizon2020 efforts have been made to ensure that insights gained in these separate areas can benefit researchers working on other aspects. A Blue Growth focus area has been set up to finance projects that cut across the separate research areas and a marine research information platform is being set up that facilitates access to results from all parts of the research programme.

In the 2014-2016 period, Horizon 2020 committed some EUR 780 million to marine and maritime research of which:

- EUR 90 million to marine research infrastructures, both observational and experimental ones. The Commission is facilitating and leveraging joint investments from European countries in major pan-European marine research infrastructures. These unique infrastructures enable research and innovation in areas such as aquaculture, marine renewable energy and biotechnology. They also contribute to instrumentation, equipment, materials to new technology developments and activities supporting jobs and growth.
- around EUR 80 million were committed to research maritime transport, which addresses challenges like safety, environmental performance (for instance air quality and noise) and competitiveness of European maritime transport industries.

Cooperation has been developed through mechanisms such as the Joint Programming Initiative for healthy seas and oceans[77] or the BONUS[78] programme for the Baltic where groups of countries share tasks and funds on common projects.

Moreover, the Marie Skłodowska-Curie actions have supported 108 Blue Growth related- projects for about EUR 20.3 million including fields of marine biology, genome research and environmental science. They provide grants for all stages of researchers' careers - be they doctoral candidates or highly experienced researchers - and encourage transnational, intersectoral and interdisciplinary mobility.

At the same time there has been an effort to increase the transfer of knowledge from research to innovation and to align research on issues of common interest with scientists based outside Europe. There are numerous examples of such efforts:

- The Horizon 2020 programme devoted significantly more attention to moving insights from the laboratory to the market. Funding rates for demonstration or innovation projects were increased from 50% to 70%. SMEs with ground-breaking ideas (like novel technologies for turning marine biomass into marketable products) can benefit from the SME instrument which allocated almost EUR 22 million to Blue Growth in its 2016-2017 work programme.
- Understanding how an ocean or sea is behaving or forecasting how it could change in the future requires a concerted effort from all those countries whose coasts it washes and all the scientists involved in monitoring or analysing it. As a follow-up to the "Galway Statement on Atlantic Ocean Cooperation" signed by the EU, Canada and the United States in 2013, EUR 140 million of Horizon2020 budget have so far be dedicated to this cooperation.

[77] http://www.jpi-oceans.eu/
[78] https://www.bonusportal.org/

4 PROMOTING A PARTNERSHIP APPROACH

4.1 SEA-BASIN STRATEGIES AND INITIATIVES

The Baltic Sea, Adriatic and Ionian Sea, Black Sea, Mediterranean Sea, North Sea and the Atlantic Ocean are all unique sea regions. This merits a tailor-made strategy that exploits strengths such as the Atlantic's renewable energy potential and addresses weaknesses such as marine pollution in the Baltic sea or maritime safety in the Mediterranean.

Sea-basin strategies provide a framework for cooperation between the European Union, the Member States and their regions and, where appropriate, third countries sharing a sea basin. Such strategies seek to address common marine and maritime challenges, find joint solutions and maximise common assets for the entire region. Typically a sea-basin strategy revolves around the opportunities of the maritime economy, for example land-sea transport, energy connectivity, protection of the marine environment and sustainable tourism are all sectors almost certain to create jobs and boost economic growth.

So far sea-basin strategies have been developed in three macro-regions: the Atlantic Ocean[79], the Baltic[80] and the Adriatic and Ionian Seas[81]. Work has focused on implementing corresponding action plans and moving forward in regions that do not have a sea-basin strategy such as the Mediterranean, the Black and North Seas.

The sea-basin strategies and the regional sea conventions that are dedicated to environmental protection in four European regional seas[82] work together. However there is room for more cooperation to develop sustainable maritime industries and further boost innovation: examples of attempts already being made to do this are the HELCOM platform for sustainable shipping[83] and the OSPAR recommendation to promote 'fishing for litter' schemes within the north east Atlantic[84].

Sea-basin strategies do not have dedicated funds. Their implementation requires a coordinated use of available funding streams. Major efforts have been made to channel support from the European Structural and Investment Funds (ESIF) towards maritime development. For example, for the Adriatic and Ionian region, it is estimated that over EUR 5 billion will be made available for

---

79 Communication "Action Plan for a Maritime Strategy in the Atlantic area Delivering smart, sustainable and inclusive growth" COM(2013)0279 final

80 COM(2012) 128 final and http://www.balticsea-region.eu/action-plan

81 Communication "A Maritime Strategy for the Adriatic and Ionian Seas", COM(2012)0713 final.

82 The Baltic Marine Environment Commission, also known as Helsinki Commission (HELCOM), the Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention), the Barcelona Convention for the protection of the marine environment and the coastal region of the Mediterranean and the Black Sea Convention

83 The aim of the Platform is to increase the co-operation between public and private stakeholders in promoting the development and use of green technology and alternative fuels in shipping in the Baltic Sea. See http://www.helcom.fi/helcom-at-work/groups/maritime/green-technology-and-alternative-fuels-platform-for-shipping/

84 http://www.ospar.org/work-areas/eiha/marine-litter/regional-action-plan

maritime actions in the Member States' operational programmes co-funded by the ESIF and national sources for the period 2014 – 2020.

Available funding channels also include Horizon 2020, LIFE, COSME and the European Fund for Strategic Investment (EFSI)[85]. For instance, and as already mentioned, Horizon 2020 alone has dedicated EUR 140 million on Atlantic-related research and innovation projects since 2014. BONUS[86], the joint Baltic Sea research and development programme is worth EUR 100 million since its start in 2010. And in the Horizon 2020 work programme for 2016-17, EUR 46 million have been earmarked for Mediterranean-related research on topics such as aquaculture, fisheries, pollution observation and monitoring system.

4.1.1 Atlantic Ocean

The 2011 Atlantic strategy and the subsequent 2013 action plan had five high-level objectives: 1/ implement the ecosystem approach, 2/ reduce carbon footprint, 3/ ensure a sustainable exploitation of seafloor resources, 4/ respond to threats and emergencies, and 5/ achieve socially inclusive growth. Their mid-term evaluation to be performed in 2017 will show whether stakeholders have promoted a 'combination of efforts' and to what extent tangible steps have been taken..

In parallel, some EU Member States participating in the Atlantic strategy have adopted national maritime development plans:

Ireland: "Harnessing Our Ocean Wealth"[87]
In 2012, the Irish Government published its Integrated Marine Plan called "Harnessing Our Ocean Wealth". The Plan is built on the results of a consultation and seeks to ensure that government departments work together on issues related to Blue Growth. It is the recognition by the Irish Government that integrated planning and actions must become the norm for marine and maritime affairs. It aims to get the environment right for investment.
The strategy includes three high-level goals, of equal importance, based on the concept of sustainable development:
- Goal 1 focuses on a thriving maritime economy, whereby Ireland harnesses market opportunities to achieve economic recovery and socially inclusive, sustainable growth.
- Goal 2 sets out to achieve healthy ecosystems that provide monetary and non-monetary goods and services (such as food, climate, health and well-being).
- Goal 3 aims to increase Ireland's engagement with the sea.
To support the vision and goals, eight enablers (including governance, research, technology and innovation") and 39 actions have been identified. The Plan also includes targets like doubling the value of the Irish ocean wealth to 2.4% of GDP by 2030 and increasing turnover up to EUR 6.4 billion by 2020.

France: "Stratégie nationale pour la mer et le littoral"[88]
France is establishing a National Strategy for the Sea and Coastal Regions. This strategy will be the blueprint for the protection of the environment, exploitation of marine resources and the integrated and

85 More information in Chapter 5
86 BONUS "The joint Baltic Sea research and development programme": http://www.bonusportal.org/
87 'Harnessing Our Ocean Wealth - An Integrated Marine Plan for Ireland' http://www.ouroceanwealth.ie/sites/default/files/sites/default/files/Publications/2012/HarnessingOurOceanWealthReport.pdf
88 Adapted from http://www.developpement-durable.gouv.fr/La-strategie-nationale-pour-la-mer.html#Travaux_d__laboration (in French)

coordinated management of activities related to the sea and the coast, with the exception of those activities whose sole object is defence or national security. It includes a long-term vision and will cover themes such as:
- The protection of areas, resources, biological and ecological balances, as well as the preservation of sites, landscapes and heritage;
- Risk prevention and coastline management;
- Knowledge, research and innovation, as well as education and training;
- The sustainable development of economic, maritime and coastal activities and the exploitation of natural mineral, biological and energy resources;
-France's participation in international and European policies to protect and enhance maritime areas and activities.

Portugal: National Ocean Strategy (NOS) 2013-2020[89]
The national strategy includes the Mar-Portugal Plan, an action plan that mainly aims at the economic, social and environmental betterment of the national maritime space by implementing sectorial and cross-sectorial projects.
Maritime spatial planning and the compatibility of existing and potential activities, along with administrative simplification, are key to the implementation of NOS 2013-2020 and the creation of the conditions necessary for Blue Growth.

These national maritime strategies are aligned with the shared Atlantic vision and complement the EU maritime policy with concrete national programmes. Some Atlantic regions have also their own maritime development strategies. This is the case, for instance, in Brittany. Hugely diverse marine natural resources, outstanding energy potential, strong maritime culture and a highly competent skills base make it a pioneering region where successful Blue Growth initiatives can develop[90]. The 'Mer Bretagne Atlantique' cluster is taking advantage of these assets to promote an innovation-driven blue economy. It has made the development of marine energy, marine mineral resources, blue biotechnology, shipping, maritime safety and security its strategic priorities.

The Atlantic Arc Commission of the Committee of Peripheral Maritime Regions (CPMR)[91] promotes cooperation between Atlantic regions. This has led to joint projects, notably projects funded by the Union's INTERREG programme[92].

The Atlantic Power Cluster
This project aims to develop transnational cooperation and joint approaches in identifying market niches in renewables and revise education and training programmes for offshore and marine renewable energies. In so doing, the project seeks to develop a greener energy model and improve the competitiveness of the Atlantic area. With almost EUR 1.4 million in funding, the European Regional and Development Fund supports up to 65% of the project's total budget.

The success of the Atlantic strategy and its action plan can be measured by the number, quality and impact of projects implemented across the Atlantic area.

89 Adapted from http://www.dgpm.mam.gov.pt/Pages/ENM_2013_2020_EN.aspx
90 http://www.bretagne.bzh/upload/docs/application/pdf/2012-07/rapport_transversal_mer_bp_2012_relecture_finale.pdf
91 http://cpmr-atlantic.org/
92 http://www.interregeurope.eu/

There is thus considerable potential for broader, deeper and more dynamic cooperation between regions in the Atlantic area and for creating mutually reinforcing benefits. However adequate funding is a prerequisite.

The EU Partnership Instrument is providing EUR 1 million under its Annual Action Programme 2014, to promote broader transatlantic cooperation with a focus on the environmental area. The activity consists of implementing three twinning projects for marine protected areas (MPAs) in the Atlantic basin in 2017, each including MPA managers from Europe, North America, South America and Africa. This project covers not only environmental protection, but also sustainable blue growth and scientific cooperation, which can inform and support EU policy objectives and foster international relations.

In addition, between 2013 and 2015, efforts were made to persuade national and regional governments that the maritime sector, as addressed in the Atlantic strategy, should be a priority for the partnership agreements with the Union and in relevant operational programmes of the European Structural and Investment Funds during the 2014-2020 period. However it generally seems that relatively little funding has been specifically earmarked for the priorities of the Atlantic Strategy in the different operational programmes of these funds, while considerable funding might potentially be available for actions and priorities that are not specific to the maritime sector. Herein lies a major challenge for national and regional management bodies. In contrast, funding from the European Maritime and Fisheries Fund has been targeted at the objectives of the Atlantic strategy.

CurioSEAty
This is a discovery route through Europe´s nautical and sub-aquatic cultural heritage. It is an example of how to combine outdoor activities and cultural heritage with the aim of promoting tourism. Partners in Spain, France, Portugal, Croatia, and Italy created common communication tools to promote the route in Europe and outside. The EU contributed EUR 150 000 covering 75% of the total costs.

Some countries like Spain and Ireland are combining the European Structural and Investment Funds with new European Fund for Strategic Investment and the Connecting Europe Facility to improve land connectivity in key ports and increase their capacity to accommodate larger ships. Other countries like France, the United Kingdom, and the Netherlands are using the EU's INTERREG funds to lead ocean energy test facilities in the Atlantic.

Access to ocean energy test centres
The FORESEA (Funding Ocean Renewable Energy through Strategic European Action) project aims to help bring ocean energy technologies to market by providing access to north-west Europe's world-leading network of test centres. Through the project, the performance of innovative ocean renewable energy technologies will be demonstrated in real sea conditions, helping to leverage the investment needed to take these new products to market. The programme is coordinated by the European industry group Ocean Energy Europe and covers test centres in the UK, Ireland, France and the Netherlands. It receives EUR 6.45 million in EU funding (60% of its total cost).

Since 2014, and under "the Galway statement", Horizon 2020 has spent EUR140 million on research and development support in the Atlantic area. There are currently 14 projects involving more than 300 research teams.

Implementation of the Galway Statement

The AtlantOS project[93] receives a funding of EUR 20 million. It involves more than 60 partners and helps to strengthen the ocean observation capacity in the whole Atlantic basin.
ATLAS[94] and SPONGES[95] projects will gather information on deep-sea ecosystems, together with Canada and the United States.

4.1.2 Baltic Sea

In 2014, the Commission adopted a 'Sustainable Blue Growth Agenda for the Baltic Sea Region'[96].

Stakeholders highlighted the need for more strategic transnational collaboration in specific Blue Growth areas. This collaboration is especially needed between players in traditional and new or emerging maritime sectors, in order to pool skills, knowledge and resources.

In the Baltic Sea Region, the Commission helps stakeholders to scope industry challenges and entrepreneurial opportunities. Initially four Blue Growth areas (blue bio-economy, shipping, environmental and monitoring technology, and tourism) were selected as representing regional and even global economic opportunities. The objective of this interactive process is to stimulate inter-regional, multi-sector and inter-cluster cooperation and promote a pipeline of projects for innovation and sustainability.

This process will result in recommendations for an implementation strategy for the Baltic Blue Growth Agenda. Thematic roadmaps will also be drawn as well as suggestions for actions and ideas for joint/networked demonstrator projects. All the outcomes will made available at the 2017 Baltic Sea Region Strategy Forum in Berlin.

At the same time, and in order to underpin the development of the blue economy in the region, a consortium of Member States receives support for cross-sectoral maritime spatial planning in the sea basin. A long history of cooperation between the Baltic States has enabled concrete cross-border mechanisms and best practices to be developed within the 'Baltic Scope" Initiative'[97]. Ties created between planning authorities were highlighted as essential in bringing the maritime spatial planning process forward in the region.

Submariner network: a flagship project under the EU Strategy for the Baltic Sea Region
This network promotes innovative approaches to the sustainable use of marine resources and acts as a hub for projects, initiatives and activities at all levels. It integrates perspectives from local to international scale, different science disciplines as well as policy and economic stakeholders.

All this work will help improve the environmental state of the Baltic Sea, an issue which will remain high on the agenda. This is indeed a prerequisite for Blue Growth in the region. Given the pressing

93 ATLANTOS 'Optimising and Enhancing the Integrated Atlantic Ocean Observing Systems' https://www.atlantos-h2020.eu/
94 ATLAS 'A Trans-Atlantic assessment and deep-water ecosystem-based spatial management plan for Europe' http://www.eu-atlas.org/
95 SPONGES 'Deep-sea Sponge Grounds Ecosystems of the North Atlantic an integrated approach towards their preservation and sustainable exploitation' http://www.deepseasponges.org/
96 Commission Staff Working Document "A Sustainable Blue Growth Agenda for the Baltic Sea Region", SWD(2014) 167 final
97 Under the European Strategy for the Baltic Sea Region.

environmental challenges in the Baltic Sea (eutrophication, nitrates from agricultural sources, over-fishing)[98], further efforts are needed. Finding common solutions to these challenges is part of the work being performed by the BONUS programme and by HELCOM which is being chaired by the EU until 30 June 2018.

4.1.3 Black sea

Since the adoption of the Black Sea synergy initiative in 2007[99], the Commission has worked to increase knowledge about the Black Sea, advocate for its sustainable use and promote coordination and synergies between different maritime players at national and sea-basin level. As part of these efforts, areas for enhanced cooperation in the blue economy and exploring for potential maritime clusters were identified[100]. Subsequently, the Commission published calls for projects to support public-private partnerships[101].

Art Reefs: a project to pilot a public-private partnership across the Mediterranean and Black Seas.
This project aims at promoting the use of artificial reefs as effective affordable tools to boost innovative and sustainable coastal and maritime tourism. Such reefs offer opportunities for Blue Growth across a wide range of activities of economic, social and environmental benefit. The project started in August 2016 and has been awarded EUR 167 500 in EU funding. The project partners are from Spain, Italy, France and Bulgaria.

In an effort to boost cooperation and support conditions for Blue Growth in practice, the EMFF is helping Romania and Bulgaria to implement cross-sectoral maritime spatial planning in the sea basin. In addition, cooperation between research institutes is supported to test marine surveillance systems[102] and map the sea bed.

An annual cycle of conferences (Bucharest 2014, Sofia 2015, Odessa 2016) informs about Blue Growth and funding opportunities. These events enabled participants to exchange best practices and share ideas. From these gatherings, a stakeholder community interested in maritime affairs and working in the blue economy emerged and now actively articulates its interests. One concrete follow-up is a bottom-up initiative in the marine research domain where prominent researchers from the Institute of Oceanology in Bulgaria and the GeoEcoMar in Romania work to identify strategic development priorities for marine research.

Despite the complex political environment in the Black Sea region, the Commission has sought cooperation with non-EU countries. It has been sustaining bilateral dialogue on maritime affairs with Turkey and holding meetings with national contact points for maritime affairs from all coastal countries. The focus is on raising awareness about the benefits of maritime integration and encouraging cooperation at regional level in areas of mutual interest.

Such an approach is helping to reduce initial scepticism from some countries and laying foundations for further EU maritime engagement in the region. Against this background and in view of the upcoming EU Council Presidencies of Bulgaria (first half of 2018) and Romania (first half of

98 COM(2016) 805 REPORT on the implementation of EU macro-regional strategies
99 Black Sea Synergy, a new regional cooperation initiative, COM(2007)160
100 https://webgate.ec.europa.eu/maritimeforum/en/frontpage/98
101 https://ec.europa.eu/easme/en/innovative-competitive-and-integrated-tools-sustainable-coastal-tourism-and-inclusive-blue-growth
102 https://webgate.ec.europa.eu/maritimeforum/en/node/3970

2019), the time seems ripe to seek consensus for a common blue economy agenda. To support that development, the Commission will launch a dedicated assistance mechanism, called 'Facility for blue economy development', in 2017.

4.1.4 Mediterranean Sea

The Ministerial Declarations of the Union for the Mediterranean (UfM) on the blue economy (2015)[103] and on environment and climate change (2014), the macro-regional EU strategy for the Adriatic and Ionian region, as well as the initiative for the sustainable development of the blue economy in the western Mediterranean (under development) provide a solid foundation and a timely opportunity for further action. The challenge now is to go from 'words to actions'.

The UfM Ministerial Declaration on the blue economy envisages tangible deliverables on regional maritime governance, research, innovation and skills. It also addresses the need to include the Mediterranean in the calls for 'Blue Careers', 'Blue Labs' and 'Blue Technologies'[104]. The Declaration also supports the idea of establishing an annual UfM forum on the blue economy to create synergies among current initiatives and provide input to future action and possible sea-basin approaches and maritime strategies, without duplicating existing initiatives and bodies. This forum will prepare the 2nd UfM ministerial conference in 2018. The Virtual Knowledge Centre, an integral part of the UfM blue economy forum, is a one-stop-shop for information exchange on projects, sharing of knowledge and networking amongst marine and maritime stakeholders, fostering cooperation in the region.

Many cooperation projects have already been carried out in recent years.

BLUEMED,[105] a marine and maritime research oriented initiative
Endorsed in October 2015, this initiative is led by Cyprus, Croatia, France, Greece, Italy, Malta, Portugal, Slovenia, Spain and Romania. It aims to coordinate research and innovation activities so as to support the sustainable management and exploitation of the Mediterranean Sea by the marine and maritime sectors. It also seeks to create synergies between regional, national and EU investments. The Commission followed up on this by including, in the Horizon 2020 work programme for 2016-2017, topics identified under the BLUEMED strategic research and innovation agenda. The EU earmarked a budget of EUR 46 million for this. This amount may increase as all topics are open to participation from partner countries.

However, because of political circumstances, progress to stimulate the blue economy in the region has been mixed. Ensuring both the safety and security of activities at sea has become an essential prerequisite for the sustainable development of blue economy activities and stability within the region. Nonetheless, in several partner countries the foundations for maritime development have been laid, and further progress is possible if cooperation in blue economy sectors is given a new boost.

[103] https://webgate.ec.europa.eu/maritimeforum/en/node/3846
[104] https://ec.europa.eu/easme/en/funding-opportunities
[105] Research and innovation initiative for blue jobs and growth in the Mediterranean area - the BLUEMED initiative: https://www.researchitaly.it/en/news/the-marine-and-maritime-sectors-the-bluemed-initiative-documents-now-online/

4.1.5 Western Mediterranean sub-basin

An initiative for the sustainable development of blue economy in the western Mediterranean has recently been developed with the western Mediterranean countries and the Union for the Mediterranean Secretariat. It aims to foster sustainable Blue Growth and jobs, improve safety and security and preserve ecosystems and biodiversity in the region.

This initiative is the outcome of the 2015 Union for the Mediterranean Ministerial conference on the Blue Economy[106]. It is to explore the added value and feasibility of maritime strategies at sub-regional level and builds on the experience of the 5+5 Dialogue launched in 1990 and which gathers Algeria, France, Italy, Libya, Malta, Mauritania, Morocco, Portugal, Spain and Tunisia. In October 2016, the Foreign Affairs Ministers of these countries encouraged further work on this initiative.[107]

While geographically speaking the initiative focuses mainly on the seas and coasts surrounding the above 10 countries, it also addresses the marine and coastal areas as interconnected systems. The scope of the actions may therefore vary depending on specific needs, and the action plan remains open to other partners in the Mediterranean region.

The western Mediterranean initiative and its framework for action are to be adopted by the Commission in spring 2017.

4.1.6 Adriatic and Ionian Sea

Mid-2014, the Commission launched the EU strategy for the Adriatic and Ionian region (EUSAIR). It mainly revolves around the opportunities of the maritime economy – Blue Growth, land-sea transport, energy connectivity, protecting the marine environment and sustainable tourism-sectors that are bound to play a crucial role in creating jobs and boosting economic growth in the region. The starting point for the EUSAIR was the maritime strategy for the Adriatic and Ionian Seas, adopted by the Commission in late 2012 and now part of the macro-regional strategy.

Activities have so far focused on setting up governance structures and rules, with the involvement of key stakeholders.[108] Priority areas for action have recently been identified, for example, maritime spatial planning, developing motorways of the seas and fostering regional cultural heritage.

Examples of projects carried out in the Adriatic and Ionian Seas

- *The Blue NET project co-funded by the EMFF will enhance business collaboration and networking among maritime clusters in the Adriatic, Ionian and Black Seas. It will result in a common methodology to collect technology features and innovation needs in each maritime cluster and promote transnational cluster development.*
- *An initiative to develop eco-friendly aquaculture by Italian and Croatian research centres and economic operators will focus on stimulating the sustainable production of flat oysters. It is at the core of the*

106 http://ufmsecretariat.org/wp-content/uploads/2015/11/2015-11-17-declaration-on-blue-economy_en.pdf

107 http://ufmsecretariat.org/foreign-affairs-ministers-of-the-55-dialogue-discuss-pressing-regional-challenges-and-highlight-the-positive-contribution-of-ufm-activities-to-the-enhancement-of-regional-cooperation/.

108 Communication of the Commission on the implementation of EU macro-regional strategies COM(2016) 805, and European Strategy for the Adriatic and Ionian Action Plan SWD(2014)190

FAIMMAC project (co-funded by the EMFF)

– *The trans-Adriatic pipeline, to stretch from Greece to Italy, is part of the southern gas corridor, a chain of projects to bring natural gas to Europe from the Caspian Basin, Central Asia, the Middle East and the Eastern Mediterranean Basin and enhance diversification of gas supply. In addition to the support of the EIB, this major investment is set to be backed by the Connecting Europe Facility.*

The BlueMED initiative mentioned above is also fully embedded in the EU strategy for the Adriatic and Ionian region. The first EUSAIR annual implementation report was submitted in 2016. The first EUSAIR annual forum took place in Dubrovnik in May 2016; the second will be held in Ioannina (Greece) in May 2017.

4.1.7 North Sea

In 2013, the European Parliament proposed and approved a 'preparatory action' for a regional strategy in the North Sea region. The aim was to engage stakeholders through workshops on project funding, management of space and resources, environmental issues and innovation.

The North Sea region is one of the most heavily-used sea areas with increasing economic activity, such as growing shipping, offshore energy development, marine food production and the development of coastal defences. It has some of Europe's biggest harbours. In 2012 it was estimated that the North Sea's blue economy represented at least EUR 150 billion (or approximately 30% of the EU total) and employed at least 850 000 people[109]. Various reports and studies have highlighted potential for growth and jobs around the North Sea.

Political declaration on energy cooperation between the North Sea Countries

The Northern Seas have been identified in the Energy Union strategy as one of the sea regions where strengthened cooperation between Member States could provide economic benefits. The North Sea could play a role for decarbonisation as it could supply from 4 to 12% of the Union's electricity by 2030. Against this background, Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Norway, Sweden and the United Kingdom signed a declaration on energy cooperation with a focus on 4 areas: maritime spatial planning, development and regulation of offshore grids and other offshore infrastructure, support framework and finance for offshore wind projects, and standards, technical rules and regulations in the offshore wind sector.

Building on such evidence could be a first step in setting up a more structured transnational partnership. For instance, and because the region shows relatively strong specialization compared to the EU average[110], a smart specialisation approach could be pursued. It could help identify potential synergies, value chain linkages, and complementary know-how and clarify which regions are specialised in specific mature, growth or pre-development activities.

4.1.8 Outermost regions

The outermost regions have unique assets and potential to develop their blue economy. They constitute a European territorial presence in strategic areas of the world. They have outstanding geographical and geological features that make them useful research and innovation laboratories

[109] Blue Growth – Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts, MARE/2010/01, Ecorys, August 2012

[110] Workshop background paper, Strategic Co-operation on Blue Growth in the North Sea, REID Consulting SPRL, June 2016

on biodiversity and ecosystems, and industries of the future such as deep-sea resources, renewable energy, climate change mitigation and biotechnology. They also offer potential for traditional activities such as fisheries and tourism.

As part of the Union's maritime policy, the Commission put forward a number of initiatives relevant for the outermost regions, in line with the actions outlines in the 2012 Blue Growth Communication. For example, as regards the use of EU funds, for those outermost regions located in the Atlantic, the 'Action plan for a maritime strategy in the Atlantic area'[111] is of special relevance (see Section 4.1.1).

In the field of knowledge networks, the outermost regions participate in the activities of EMODnet (See Section 3.1) through, for example, research and academic bodies located there.

In late 2016, the Commission launched a study to help outermost regions find sustainable Blue Growth opportunities, taking into account the status of their blue economies and their specific assets and challenges. This study will examine the state of play of assets and potentialities, and look at the obstacles to and drivers for Blue Growth in each region and at sea-basin level. The study will also consider measures and initiatives to help the regions to develop their potential, also in the context of their neighbourhood links, for example with overseas countries and territories.

The results of the study, in particular as regards possible measures to help outermost regions take full advantage of their potential in the blue economy, could be the basis for a specific Commission initiative targeting these regions, in the context of the EU maritime policy.

4.2 Regional Initiatives

Maritime and blue economy development has been embraced by over 40 regions within the Union.

[111] Action Plan for a Maritime Strategy in the Atlantic area COM(2013) 279 final.

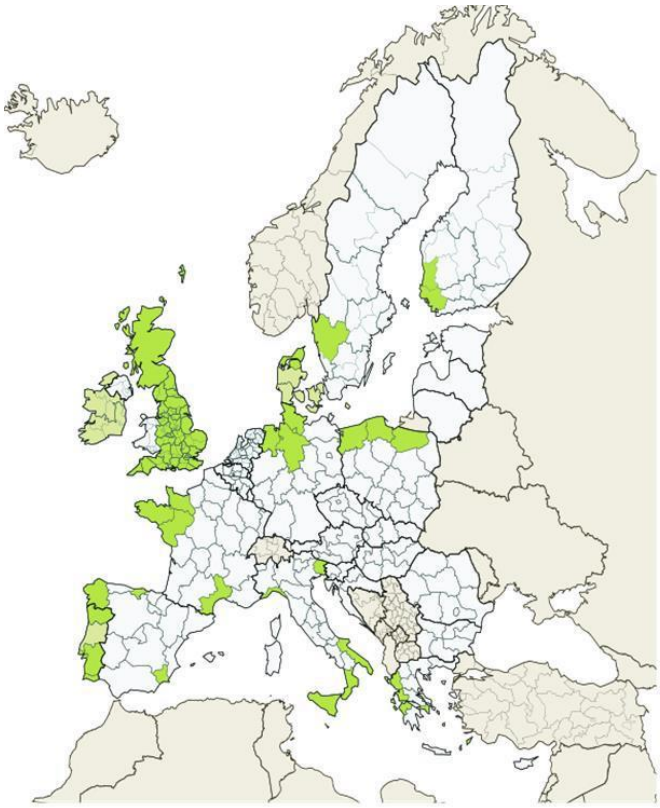

Figure 2 EU Regions which have earmarked Blue Growth as a priority[112]

Amongst the areas that emerge as a focus for investments are aquaculture and fisheries, marine knowledge, blue renewable energy, biotechnology, tourism and recreational activities, environmental sustainability, shipbuilding and smart grids.

There is considerable opportunity to promote local initiatives and achieve critical mass by combining forces and linking capacity across regions. Doing so will help pool financial resources, especially within the European Regional Development Fund (ERDF). The 'smart specialisation' agenda, introduced in the current round of ERDF programmes, could be used to explore and exploit (cross-cutting) niches of excellence in the maritime sector and beyond. The potential of working together with neighbourhood countries and promoting international cooperation could also be further explored.

The NEPTUNE project: a link between smart specialisation and Horizon 2020
This project implements a Blue Growth Accelerator supporting the development of cross-sectoral and cross-border industrial value chains that mix water, aerospace, information and agriculture technologies. There are 12 partners from Spain, Greece, France, Italy, Poland, Romania and Sweden. The total funding for 2014-2020, amounts to EUR 130 million. NEPTUNE will support at least 100 small and medium-sized enterprises for the development of 40 innovative Blue Growth solutions. Each business will receive an innovation voucher of p to EUR 60000 for the innovation services.

Maritime clusters could be a useful tool to promote and implement such cooperation. Indeed Blue Growth industries are among the fastest growing emerging industries with a high economic and

[112] Source: Smart Specialisation Platform http://s3platform.jrc.ec.europa.eu

innovative potential and showing the most dynamic cross-sectoral linkages to other industries and technological areas[113]. A maritime cluster is a geographic concentration of interconnected businesses, suppliers, and associated institutions in a particular field. Areas identifying themselves as maritime clusters emerge from traditions in shipbuilding, fisheries, offshore oil and gas or naval activity but aim to look for new opportunities in other activities. Cluster organisations, either supported by public authorities or by business, may then be set up to promote communication between the components of the cluster, identify common needs, for instance with regard to infrastructure or education, and channel public investment.

Blue Growth on the ground

- *Blue Growth Port of Vigo (2016-2020). This initiative showcases how the Blue Growth strategy can be translated into very concrete actions. The strategy aims to create 3000 additional jobs by 2020. This comprehensive initiative of the Port of Vigo could act as a possible model for other ports in the future[114]*
- *Together with the port community Deltalinqs, the municipality of Rotterdam and knowledge institutes, the Port of Rotterdam Authority is working on promoting the port as an area for scientific research, apprenticeships and internships and jobs. The educational programme 'From cradle to quay!' covers all educational stages: from primary school to university. It has been designed with businesses in the port, educational institutions and public authorities in the region.*
- *Mersey Maritime, which represents the interests of over 1700 businesses in maritime and energy industries, has contributed to the regeneration of Liverpool by forging closer collaboration between these industries and the educational sector, including through the opening of apprenticeship schemes to SMEs.*
- *The maritime economy is not limited to the coast. It has activities in the entire single market. For instance Luxembourg established a national maritime cluster including 56 businesses with maritime connections from the transport, logistics, legal services and consultancy sectors. Since 2000, the number of ships registered in Luxembourg has increased from 150 to 240, representing a tonnage comparable with those registered in Sweden or Spain[115].*

The EU has supported activities of maritime clusters through:

- A European cluster observatory which is a single access point for statistical information. The observatory produces, on a biannual basis, the European Cluster Panorama[116] . In 2014 the Panorama identified Blue Growth as one of the 10 emerging industries. The 2014 cluster trend report[117] identified and analysed cluster dynamics of the blue growth industries..
- The clusters excellence programme which has been supported by COSME. The 'maritime technology cluster' from northeast Italy has been awarded a silver label, and maritim, organisations from eight Member States have been awarded the bronze label.
- A number of mechanisms which are in place to help clusters look for partners and markets beyond their geographical boundaries. Such mechanisms include 'European strategic cluster partnerships'118 and "cluster-facilitated projects for new industrial value chains119' which is a Horizon 2020 instrument with a seven-year budget of EUR120 million.

113 European Cluster trends, April 2015, http://ec.europa.eu/DocsRoom/documents/10043
114 http://bluegrowthvigo.eu/en/
115 Source: Conference of the Peripheral Maritime Regions, February 2017.
116 http://eco2.inno-projects.net/2014-10-15-cluster-panorama-d1.4a.pdf
117 http://ec.europa.eu/growth/smes/cluster/observatory/european-cluster-trend-report_en
118 http://www.clustercollaboration.eu/eu-cluster-partnerships
119 http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/innosup-01-2016-2017.html

– A regular dialogue between the Commission and the European network of maritime clusters.

Demonstration projects for blue technology
The EMFF's 'Blue Technology' action will fund 3 projects developing each roadmaps and demonstration project concepts in key blue economy domains linked to regional smart specialisation strategies. This will make the transfer of research results into business ventures easier and bring new technologies faster to a commercial and industrial scale. These clusters are close to industry and businesses and their innovation needs and opportunities. They are also a key policy instrument for local/regional economic development and often play an important role in setting public investment strategies and priorities.

4.3 WORKING WITH STAKEHOLDERS

Dialogue and consultation with stakeholders in the public, science, business and non-profit maritime sectors have been a core principle of the Blue Growth policy from the outset. Maritime policy is collaborative and based on partnership, and the Commission has taken steps to make maritime and marine policies more visible and understandable to different audiences. It has also engaged stakeholders by offering them opportunities to share expertise, data and knowledge.

The following examples illustrate the scope of those actions:

– The **European Maritime Day** is the annual meeting point and roadshow for Europe's maritime community to network, discuss, and forge joint action in support of the maritime policy and Blue Growth. Established in 2008, the event has become a fixture on the European maritime agenda, driven by strong stakeholder involvement and ownership. Port cities from all over Europe have hosted a European Maritime Day. European Maritime Day regularly attracts more than 1000 participants, with a record 1300 attendees in Piraeus, Greece in 2015. Events for the general public organised around a European Maritime Day draw thousands of visitors. European Maritime Day has also become a popular reference on the web: a simple Google search for 'European Maritime Day' results in close to 936 000 hits. The attractive mix of stakeholder-led workshops, plenary debates, exhibition space and matchmaking meetings is constantly evolving based on stakeholder feedback/evaluations and new concepts/formats being introduced and tested.

– 160 organisations from Europe and beyond participate in the **European Marine Observation and Data network**. The main purpose of EMODnet is to unlock fragmented and hidden marine data resources, to make these available to individuals and private and public organisations (public and private), and to facilitate investment through improved access to quality-assured, standardised and harmonised marine data which are interoperable and free of restrictions on use. From 2013 to 2016, EMODnet has moved from a prototype to an operational service with full coverage of all European sea-basins, a wider selection of parameters and medium resolution data products (see Section 3.1)

– A **Blue Economy Business and Science Forum** was created in 2016. It is a platform for business, science, finance and policy representatives to exchange knowledge and experiences and discuss opportunities for and barriers to innovation in the blue economy. It is also meant to provide a sounding board for industry and an opportunity for the participants to provide advice to the Commission. In September 2016, the Hamburg Summit event was the first gathering of the Forum.

- The Forum also hosted the first edition of the Blue Economy business **awards**, which showcase success stories and demonstrate how new applications from marine research can produce jobs and growth in the marine economy. In addition, a 'woman of the year in the blue economy' and the 'rising blue star of the year (up to 35 years old)' prizes were awarded.

- The European **Atlas of the Seas** was launched as an educational tool highlighting the European common maritime heritage. It provides a diverse range of an up-to-date information on Europe's seas and coasts, human activities and EU policies. It is presented in the form of maps and charts with facts and figures. The Atlas is also a response to policy and stakeholders' needs to share aquaculture and fisheries information. The feed-back from users is very positive and interest in the Atlas is steadily growing. It is the most visited page of the maritime affairs website. It gets financial support from the Commission (EUR 235000 for 2015 and 2016).

- An online **maritime forum**[120] has been set up to improve communication among stakeholders. As much information as possible, for instance summaries of expert group meetings and studies, is made available for comments. The most popular pages so far concern spatial planning worldwide. Then, in descending order of popularity, there are studies on deep-sea mining, Blue Growth, shipping density and maritime clusters in the Mediterranean and Black Sea. The most comments were received on a study to measure the blue economy.

- Engaging with fisheries and aquaculture **advisory councils** may create new opportunities for the maritime economy. Advisory councils are stakeholder-led organisations whose purpose is to provide the Commission with advice and opinions to inform EU policy work.

4.4 INTERNATIONAL COOPERATION

International activities have been carried out under the umbrella of the sea-basin strategies and initiatives. In the Mediterranean, the Union for the Mediterranean (UfM) is becoming more and more involved in maritime affairs; in the Black Sea a new cooperation facility is to be deployed and work on the development of a strategic research and innovation agenda was initiated. In the Atlantic, the EU, the United States and Canada are cooperating through the 'Galway Statement Process[121]'. Expanding marine and maritime scientific cooperation to the South Atlantic, notably with Brazil and South Africa is well on its way.

In spring 2016, the Commission and the High Representative for Foreign Affairs published a Joint Communication on an integrated EU policy for the Arctic[122]. The policy focus is on climate change, safeguarding the Arctic environment and at the same time unlocking the potential for sustainable development under Arctic conditions. As research, science and innovation are important assets and

120 https://webgate.ec.europa.eu/maritimeforum/en

121 Galway Statement: http://ec.europa.eu/research/iscp/pdf/galway_statement_atlantic_ocean_cooperation.pdf

122 Joint Communication on an integrated EU policy for the Arctic JOIN(2016)21

activities, the Horizon 2020 work programme for 2016-17 includes a EUR 40 million package focusing on the following topics: the building of an integrated Arctic observing system; the impact of Arctic changes on the weather and climate of the Northern Hemisphere; and the effects of permafrost melting.

BLUE ACTION
This project is coordinated by a Danish institute. It will provide empirically grounded data that will quantify and explain the role of a changing Arctic in making it easier to predict the weather and climate of the Northern Hemisphere. The ultimate goal is to build on innovative statistical approaches to predict weather and climate extremes. The project has been awarded a EUR 7.5 million grant from Horizon 2020.

The EU commitment to promote the conservation and sustainable use of marine resources and the growth of the blue economy was reiterated in the EU Global Strategy of Foreign and Security Policy of June 2016[123].

In addition, the potential of oceans for boosting growth jobs and innovation was spelt out in the Ocean Governance policy adopted late 2016[124]. Such actions can, for instance, be global maritime research alliances; initiatives to improve marine data transparency globally, building on the EMODnet experience; the establishment of a global maritime security dialogue based on the EU Maritime security strategy; and a global legal framework for exploration of new ocean resources in cooperation with the International Seabed Authority.

[123] https://europa.eu/globalstrategy/sites/globalstrategy/files/regions/files/eugs_review_web.pdf
[124] Joint Communication on 'International ocean governance: an agenda for the future of our oceans', JOIN(2016) 49

5 BOOSTING INVESTMENT

Automation, digitalisation and global competition are leading to stagnation or a decline in employment in traditional maritime industries. In the meantime, there is a growing demand for jobs and investment in new and emerging sectors. .

The Union is making concerted efforts to maximise the amount of funding for Blue Growth projects. The focus is on promoting innovation – new technologies, new products and new services- and fostering investment, especially where financial markets are reluctant to lend to or provide capital for unfamiliar or first-of-a-kind activities. Remedies can be found by increasing the use of financial instruments to leverage EU funding programmes. This can be done through incentives for public procurement of innovative services or through targets for energy production. The Commission has been working increasingly in partnership with the European Investment Bank (EIB) to support investment in the blue economy.[125]

5.1 MAINSTREAMING BLUE GROWTH IN THE EUROPEAN STRUCTURAL AND INVESTMENT FUNDS (ESIF)

The European Maritime and Fisheries Fund (**EMFF**) is specifically tailored to Europe's seas and coasts. Its EUR 6.4 billion budget (2014-2020) focuses not only on underpinning the new Common Fisheries Policy but also on diversifying local maritime economies and the sustainable development of maritime regions.

The bulk of this budget is used through 'shared management', that is funds managed by the individual Member States. Four out of the six EMFF objectives[126] addressed by shared management are contributing to blue economy. The budget allocated for 2014-2020 is as follows;

Objective	EMFF priorities	Total contribution amount
2	Fostering environmentally sustainable, resource efficient, innovative, competitive and knowledge based aquaculture	1.209.481.311
4	Increasing employment and territorial cohesion	250.000.000
5	Fostering marketing and processing	500.000.000
6	Fostering the implementation of the Integrated Maritime Policy	71.055.600
	TOTAL	2.030.536.911

This table shows that a total of EUR 71 million have been allocated to activities other than fisheries and aquaculture. The aim is to trigger sustainable growth and job creation in areas such as maritime surveillance (Common Information Sharing Environment - CISE), marine knowledge, better planning of activities at sea, sustainable exploitation of new marine resources (such as energy and biotech), and strategies for sea-basins according to their specific needs. This comparatively small amount has been spread out further between 20 national allocations.

[125] Information about the budget allocation for Blue Growth within different EU funds is incomplete. The content of this section is based on the best available knowledge at this point in time.

[126] Regulation N°508/2014 of the European Parliament and the Council on the European Maritime and Fisheries Fund, Article 6.

In addition, EUR 260 million were set aside for the Commission to manage maritime policy projects directly (so-called 'direct management'), EUR 139,6 million of which had been earmarked for projects and programmes by 2017 (see breakdown below). Those funds were targeted specifically at maritime priorities and needs and have played a considerable and decisive role in piloting the Blue Growth strategy.

	2014	2015	2016	2017	TOTAL
Maritime Security/CISE	8,250	3,078	2,190	1,250	14,768
Maritime Spatial Planning	8,230	7,130	7,077	3,500	25,937
Marine Knowledge	5,680	14,270	13,890	11,760	45,600
Ocean Governance	-	0,300	0,250	1,700	2,250
Sea-basin Strategies	0,150	2,496	0,360	1,500	4,506
Skills	0,260	-	3,452	1,500	5,212
Blue economy	1,790	0,640	5,779	10,500	18,709
Communication	1,550	1,186	1,858	2,147	6,741
Environment (MSFD implementation and other environmental topics)	3,260	3,637	4,270	4,270	15,437
Evaluations of the Union's Maritime policy (EMODNet and Atlantic Strategy)	0,150	-	-	0,300	0,450
TOTAL	29,320	32,737	39,126	38,427	139,610

Integrated Maritime Policy direct management part in EMFF (2014-2017) in MEUR

Examples of projects supported by the EMFF

- *The Blue Careers action supports collaboration between business and education institutions at local and regional level or at transnational level to close the skills gap, develop qualifications to tackle the unemployment challenge and raise the attractiveness of 'blue careers' among students. In 2016, a budget of EUR 3.452 million was allocated to seven projects covering both higher education and vocational training. They started at the beginning of 2017[127].*
- *The SIMWESTMED project is receiving over EUR 2 million to support the implementation of the Maritime Spatial Planning Directive and carry out concrete, cross-border cooperation initiatives between four Member States (Spain, France, Italy and Malta) in the western Mediterranean region.*
- *The Galician authorities initiated a programme aiming at promoting the consumption of fresh fish among primary school children. The programme also educated kids on marine species and the role of consumers in preserving marine resources. Kids were also explained the maritime professions. Thanks to an EU contribution of EUR more than 1 million, around 150 000 special meals were served every year to 18 000 children and workshops were organised in 100 schools, involving 15 000 kids per year.*
- *In Hungary, the EMFF provided a contribution of EUR 440 000 for the modernisation of processing factories in Szarvas and Tiszacsege. New equipment included, among others, a mechanical water cleaning system in order to make water supply safer and cleaner.*
- *In Denmark, the Løvlund aquaculture farm was equipped with a new system which reduced its environmental impact and divided the water consumption by 2. The trout production more than tripled. The EMFF supported this project with a contribution of EUR 812 million.*

Other European Structural and Investment Funds, in particular the **European Fund for Regional Development** (ERDF), offer many openings for investment in the blue economy by supporting innovation, businesses, the development of sustainable tourism, the protection of biodiversity and renewable energy. The Commission made considerable efforts to encourage mainstreaming

127 https://ec.europa.eu/easme/en/news/evaluation-results-blue-careers-and-blue-labs-calls

maritime investments in the ERDF and convince regional and local planning authorities to earmark more structural funding for the blue economy. This effort has started to pay off. For the 2014-2020 period more than EUR 5.5 billion have been allocated to blue economy from the ERDF budget.

Examples of ERDF support

- *Fuel ships transport oils barrels by the millions across the Baltic Sea every day, yet there are risks involved that could cause major oil accidents. The 'Minimizing risks of maritime oil transport by holistic safety strategies (MIMIC)' project is run by Estonia, Sweden and Finland. It uses computer models to simulate maritime traffic growth scenarios, rpute and vessel-specific accident probabilities, as well as the environmental and financial consequences of an oil spill in the area. It is supported by an ERDF contribution of EUR 1.5 million.*
- *West Wales, which is classified as a less developed region, has estimated that with support from the ERDF it will spend EUR 100 million on ocean energy over seven years.*
- *The outermost regions bear additional costs due to their difficult accessibility. To compensate these costs, substantial sums have been reserved under the ERDF – EUR 58 million for the Azores, EUR 57 million for Guadeloupe, EUR 484 million for the Canary Islands and EUR 28 million for Mayotte. Some of these funds will be spent on ports.*

Opportunities for job creation in the maritime economy have been well taken into account and reflected in the **European Social Fund** (ESF) operational programmes of the coastal regions. This could lead to more training and the setting-up of schools and/or institutes specialised in marine and maritime affairs. The programmes also provide for measures such as self-employment, entrepreneurship and business creation. They are complementary to the measures in the EMFF to promote human capital or diversify incomes.

Examples of projects supported by the ESF

Puglia (Italy) – the regional operational programme (ERDF ESF) dedicates about EUR 571 million to preserving and protecting of the environment, with strong references to improvement of the marine and coastal environment. Also, about EUR 163 million are being invested in measures to adapt to climate change. Moreover this operational programme shows clear links between improvement and valorisation of nature areas and economic activities (tourism in particular).

In addition, 15 Member States[128] benefit from the **Cohesion Fund** (CF) that aims to reduce economic and social disparities and promotes sustainable development. It allocates a total of EUR 63.4 billion to trans-European network and environment projects. For the 2014-2020 period, more than EUR 2 billion have been allocated to Blue Growth projects.

Upgrade of Limassol port

The need to accommodate a new generation of larger passenger and cargo ships is behind a dredging project and harbour extension of the Cypriot port of Limassol. The project will substantially increase the capacity of Cyprus' biggest port: from 643 000 containers a year to over one million. The EU contribution amounts to EU 21.500 million from the Cohesion Fund.

After 3 years into the 2014-2020 multiannual financial framework and despite the progress made, there is still room for more investment in the blue economy by the ESIF. For that to happen, those who are eligible to access funding (particularly small and medium size enterprises and research establishments) need to take advantage of the opportunities offered by the ESIF. This will require

[128] For the 2014-2020 period, the Cohesion Fund concerns Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia.

initiative from both national and regional stakeholders. The Commission has been helping them, for instance, by setting-up 'assistance mechanisms' in the Atlantic Area[129] and in the Black Sea. The Commission will shortly evaluate whether that approach has worked.

5.2 BOOSTING RESEARCH AND INNOVATION IN MARITIME SECTORS

Consolidating and expanding Europe's leadership in maritime technology should be a priority. Many maritime technology sectors have the potential to provide more jobs, growth, renewable energy sources and climate-smart solutions. However, a risky environment and insufficient access to knowledge and data are critical barriers to this. EU intervention is therefore needed 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.

The R&D funding for maritime innovation has been prioritised under the **Horizon 2020** and specific Blue Growth calls have been launched to give more visibility and create coherence. Under the current programming period, around EUR 260 million are being invested annually to support marine/maritime-related projects..

Blue labs to support start ups
The EMFF's 'Blue Labs' pilot action,, with a preliminary budget of EUR 1.7 million, builds on projects supported by Horizon 2020 and the ESIF. It supports 'Blue Labs teams' in which researchers, industry and local stakeholders work together to take research and innovation results forward closer to the commercial stage. Four projects started at the beginning of 2017. In the Blue Labs projects, partnerships have been set up combining different disciplines, capitalising on research results and seeking complementarities with other funding programmes. The four priority topics for 2016 were marine litter, blue (bio)remediation, underwater cultural heritage, invasive alien species and jelly fish proliferation.

One of the key obstacles to innovation and job creation in Europe, including in the blue economy, is the lack of available financing at acceptable terms to innovative businesses. To overcome this, the Commission and the EIB Group **launched 'InnovFin** – EU Finance for Innovators'. InnovFin aims to facilitate and accelerate access to finance for innovative businesses and other innovative entities in Europe. With a support rate of up to 50%, it is expected to support up to EUR 48 billion in final investments in research and innovation. In 2015 the Commission and the EIB launched a study to assess access-to-finance conditions in the bio-based industries and blue economy. The outcomes will be released in 2017.

InnovFin project on marine renewables
A first-of-a-kind demonstration project that converts wave energy into electrical power will be built thanks to an EU loan of EUR 10 million from the new InnovFin Energy Demo Project Facility[130]. The deal will enable a Finnish company to build a full-scale demonstration unit of their WaveRoller concept in Portugal. The loan is provided by the EIB and backed by Horizon 2020.

In addition, the **NER300**[131] programme aims to support innovative low-carbon energy demonstration projects and seeks to leverage private investment and/or national co-funding across the Union. It has been conceived as a catalyst for the demonstration of environmentally safe carbon

129 http://www.atlanticstrategy.eu/
130 http://ec.europa.eu/research/index.cfm?pg=newsalert&year=2016&na=na-060716
131 http://ec.europa.eu/clima/policies/lowcarbon/ner300_en

capture and storage (CCS) and innovative renewable energy technologies on a commercial scale. Its funding does not come from the EU budget but from the EU emissions trading system (EU ETS). The funds from the sale of emission allowances are distributed to projects selected through two calls for proposals, covering 200 and 100 million allowances each. From the 2012 and 2014 calls, EUR 477.7 million have been allocated to maritime projects.

NER300 Blue Growth project
The NEMO project is a 16 MWe floating ocean thermal energy conversion system. It is expected to be mounted within a floating barge moored some 5 km off the west coast of Martinique, with export cable landfall by the Bellefontaine oil-fired, thermal power plant. It aims to deliver approximately 395 GWh in the first 5 years of operation. It received a grant of EUR 72 million from NER300.

5.3 FINANCING MARITIME SECTORS: CONNECTING EUROPE FACILITY (CEF) AND COMPETITIVENESS OF ENTERPRISES AND SMALL AND MEDIUM-SIZED ENTERPRISES (COSME)

The Connecting Europe Facility (**CEF)** budget already supports the development of maritime sectors, especially through the Motorways of the Seas policy by focusing on environmental projects related to port infrastructure. This lowers the carbon footprint of the European fleet and helps the industry to comply with European and international legislation on air quality[132]. Another priority area is safety, for instance with ad-hoc training courses. In this context, and in the last 2 years, the Commission has granted a total of nearly EUR 360 million to 40 actions, which has triggered a European-wide investment of EUR 965 million.

In addition, the Green Shipping Guarantee Programme is intended to provide guarantees to activities related to sustainable shipping. It covers, in particular, commercial loans and guarantees to finance new green shipbuilding projects, the retrofitting of vessels, energy efficiency (hull treatment for example) and more environmentally friendly operations (like water ballast treatment). The Programme totals EUR 750 million and is based on a joint allocation from the CEF financial instrument and the EIB contribution under the European Fund for Strategic Investment. ..

CEF projects
- The WINMOS II project receives a grant of nearly EUR 19 million to secure year-round navigation in the European northernmost waters while further developing cooperation on icebreaking services between Finland, Estonia and Sweden.
- In November 2016 the EIB signed an agreement with Société Générale in France, combining the CEF debt instrument and EFSI resources to provide a EUR 150 million guarantee for the construction of sustainable, environmentally ffriendly ships.

[132] For instance, the International Convention for the Prevention of Pollution from Ships (MARPOL) and its Annex VI which addresses air pollution; Directive 2012/33/EU of the European Parliament and of the Council of 21 November 2012 amending Council Directive 1999/32/EC as regards the sulphur content of marine fuels; and Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure.

Businesses can benefit from **COSME**[133]**,** the EU programme for the competitiveness of enterprises and small and medium-sized enterprises. COSME aims to promote entrepreneurship and improve the business environment for SMEs**.** So far, three projects related to Blue Growth and promoting sustainable maritime tourism have been supported with a budget of nearly EUR 617 500.

COSME project
The SeaEurope project creates a tourism route that connects European coastal destinations with a rich biodiversity. The projects partners are from Spain, UK, Ireland, Italy and Croatia. The EU has contributed to EUR 187500.

5.4 RISK FINANCING THROUGH THE INVESTMENT PLAN FOR EUROPE

In the blue economy, the need for capital-intensive infrastructure and the demand for risk financing are high. At world level, USD90 trillion (EUR 84 trillion) are expected to be invested in infrastructure (much of it on the coast), within the next 20 years[134]. Global investment needs for offshore renewables have been estimated at EUR 690 billion by 2040. The European offshore wind energy industry alone needs to attract between EUR 90 billion and EUR 123 billion by 2020 to meet its deployment target of 40 GW[135].

However, current low levels of investment constrain the blue economy and activities cannot reach scale. This is particularly the case in the marine renewables sector where high risks and longer-term paybacks often limit investors' appetite.

There are at least four areas in which investment is needed:

- reducing the investment risk in scaling up emerging sectors, for example in creating a risk insurance fund for ocean energy;
- enabling infrastructures, for example the North Sea electricity grid;
- large-scale turnkey projects such as tidal lagoons;
- green infrastructure (such as constructed wetlands) which has the potential to achieve multiple benefits while saving costs.

The Investment Plan for Europe can help mobilise investment in these areas. It has three pillars:

- mobilising finance for investment via the European Fund for Strategic Investment (**EFSI**) implemented by the EIB and in cooperation with national promotional banks;
- making finance reach the real economy through the **European Investment Advisory Hub** and the **European Investment Project Portal**;
- improving the investment environment by removing non-financial, redundant regulatory barriers in key sectors, and structural reforms at national level.

In this context, EFSI deserves special attention since it is meant to mobilise at least EUR 315 billion in investment between mid-2015 and mid-2018.

---

133 https://ec.europa.eu/growth/smes/cosme_en
134 Global Commission on the Economy and Climate, 2014. Better Growth, Better Climate.
135 "Where's the money coming from? Financing offshore wind farms", a report by EWEA, the European Wind Energy Association, November 2013.

As of January 2017, a total of 15 projects (representing around 8,5% of the signed/approved/pre-approved infrastructure projects) have been identified as focusing on the blue economy. The total amount needed from EFSI to finance these maritime projects can be estimated, on the basis of available data, at EUR 3 billion. This is expected to trigger nearly EUR 13 billion in investment[136]. The blue economy-related sectors that might benefit most from EFSI are:

- Maritime infrastructure: energy generation and distribution, port infrastructure, port connections

A Spanish state Fund for ports accessibility consists of a framework loan to fund rail and road access investments in state-owned ports in Spain. It will help improve land connectivity in key ports all located in the TEN-T Network. EFSI financing: EUR 105 million; total investment expected to be triggered: EUR 425 million.

- Research/development and SMEs: vessels prototypes and research vessels.

- *The Baleria Green Fleet Renewal project will modernise a fleet through the acquisition of new dual-fuel vessels. EFSI financing: EUR 75 million; total investment expected to be triggered: EUR 350 million*
- *The Green Shipping Programme Loan will finance small shipbuilding projects including the conversion and retrofitting of vessels that promote sustainable transport, TEN-T and environmental protection. EFSI financing:: EUR 250 million; total investment expected to be triggered: EUR 500 million.*

- Resources and environment: resilience to climate change, coastal and cruise tourism.

The Green Shipping Guarantee Programme will accelerate investments in greener technologies by European shipping companies. It is to be launched in a pilot-phase with an EFSI financing of EUR 750 million which is expected to trigger EUR 3 billion.

At this stage, and because the Investment Plan is still young, it is premature to fully assess its effectiveness in the blue economy. However some preliminary observations can be drawn from its first years of implementation.

First there has been a slow uptake by the maritime sectors of the possibilities offered by the EFSI. For EFSI, there are no quotas, sectorial or regional, and that project support is demand driven. In the future, and to ensure that the Investment Plan effectively supports the development of the blue economy, advocacy should be carried out vis-à-vis the Member States and project promoters with the aim at facilitating more investment and building a pipeline of investable Blue Growth projects. There are several tools available to support sectorial coverage, including:

- combining the use of EFSI with other EU funds, notably the ESIFs;
- setting-up investment platforms (e.g. thematic, national, regional, cross-border or addressing smaller projects)
- more targeted technical assistance and local outreach from the European Investment Advisory Hub.

Also the National Promotional Banks can stimulate investments and have a key role in implementing the Investment Plan. Their experience and capabilities at regional level are essential for maximising the impact of public funds.

136 http://www.eib.org/efsi/efsi-projects/index.htm

Second, in terms of geographical coverage, the North Sea leads in a number of (signed/approved/pre-approved) projects and in volume of investments. In terms of distribution of projects between Member States, the top three are the United Kingdom, Belgium and Spain. The other Member States and notably the EU13[137] are absent. The picture is different when screening the projects uploaded in the European Investment Project Portal with many project promoters from Greece, Bulgaria, Estonia, Latvia and Romania. The lower EFSI support in these countries may be due to a limited technical capacity to develop large projects, less experience with public-private partnerships and a less developed venture capital market.

In addition the sector coverage shows that the EFSI has, so far, contributed to offshore wind, modernisation of fleets and ports accessibility. More innovative sectors like ocean energy, offshore aquaculture and blue technology are not covered. Yet these sectors face difficulties in obtaining access to finance, which prevents them from achieving their economic potential. There would seem to be a stronger need for the EFSI to provide higher risk financing, especially in a context of innovation and emerging promising technologies. Investment platforms targeting smaller scale but central projects may be helpful.

5.5 IMPROVING AND VALORISING NATURAL CAPITAL: LIFE+

Healthy seas and oceans are vital to Blue Growth.

However the number of LIFE projects that have a marine element is quite low overall. LIFE is the EU's financial instrument supporting environmental, nature conservation and climate action projects. It has a budget of EUR 3.4 billion for 2014-2020. Currently 32 projects are ongoing with a total European contribution of EUR 34.6 million.

The LIFE Blue Natura project
It received a LIFE grant of up to EUR 1.5 million aims to quantify the carbon deposits and sequestration rates of marsh and sea grass habitats in Andalusia.

[137] Bulgaria, Czech Republic, Croatia Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.

6 MAKING BLUE GROWTH STRATEGY FIT FOR FUTURE CHALLENGES – TODAY'S TRENDS IN THE BLUE ECONOMY

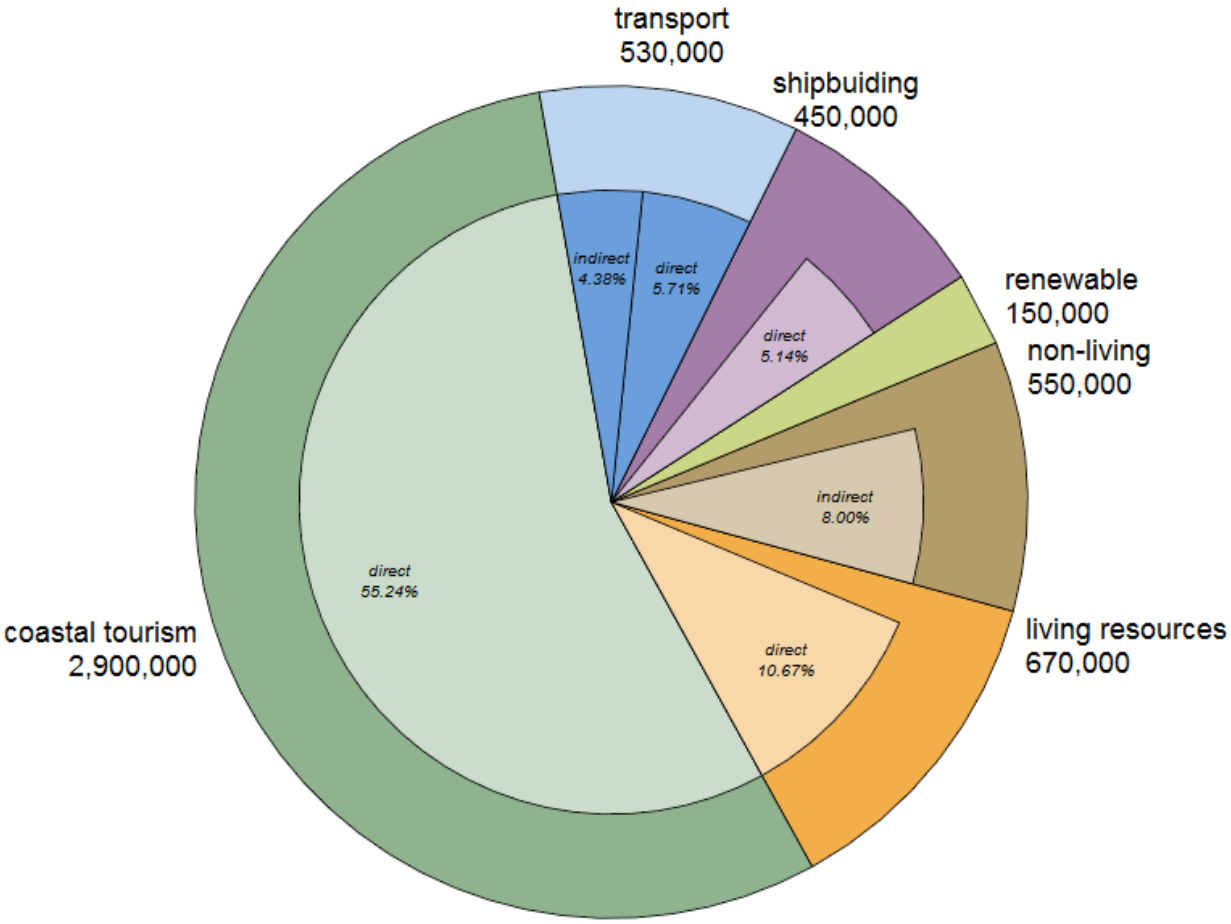

Figure 3 employment in blue economy. Indirect employment includes those companies providing goods and services to the primary sectors.

Approximately 97% of the more than 5 million people working in the blue economy are employed within five broad sectors – (1) shipping, (2) shipbuilding, (3) non-living resources (primarily oil and gas), (4) living resources (fishing, aquaculture, processing) and (5) coastal tourism. Shipping has returned to pre-crisis levels; shipbuilding - although highly successful in certain technologically specialised sectors such as dredgers, luxury yachts and cruise ships - relies increasingly on naval orders; the offshore petroleum industry is suffering from the low oil price; fishing and aquaculture production is stagnant although aquaculture in particular is still growing outside the EU. And coastal tourism turnover is expanding slowly, with an increasing proportion of spending by visitors from outside the EU. But an industry outside these sectors and that did not exist ten years ago, offshore wind, is now the fastest growing. It now employs about 150,000 people which is more than the number of fishermen. A challenge for maritime policy now is to encourage the growth of these

new or emerging activities by overcoming obstacles, stimulating innovation and encouraging investment.

The approach used here for measuring the nature, state and dynamics of the blue economy is based on figures that national administrations report to the EU's statistical office Eurostat[138]. The main exceptions are (1) the living resources data which are mainly derived from data submitted by EU countries under the Data Collection Framework[139] and (2) offshore wind. Here we use the analysis of the industry body WindEurope.

We distinguish between primary and secondary industrial activities. Primary activities are those where the entire industry can be considered as maritime. Secondary, or indirect, activities are those industrial sectors that are not entirely maritime but that provide products and services to the primary activities[140]. This includes most of the marine equipment sector and legal or insurance services. To avoid double counting, products and services provided by primary sectors to other primary sectors – for instance the supply of ships for transport or fishing – are not included in the numbers reproduced in
Figure 3. The trends shown below also include estimates taken from the Labour Force Survey[141] which, in contrast to the other estimates from surveys of industry, collects data from households.

6.1.1 Shipbuilding

		turnover (billion euro)	added value EUR billion	employed
	Building of ships and floating structures	27	7	144,000
	Building of pleasure and sporting boats	9	2	52,000
	Indirect	.	28	160,000
repair	Repair and maintenance of ships and boats	9	3	88,000
	Indirect		6	33,000

[138] The main variables were taken from Eurostat's structural business statistics which are available on line.

[139] Council Regulation (EC) No 199/2008 of 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy

[140] Secondary activities were identified through input output-tables. Employment in these was determined by dividing the purchases from the primary activity by the turnover to employment ratio in the secondary. Both these numbers are available on-line from Eurostat structural business statistics.

[141] The Labour Force Survey data were obtained from a customised extraction by Eurostat.

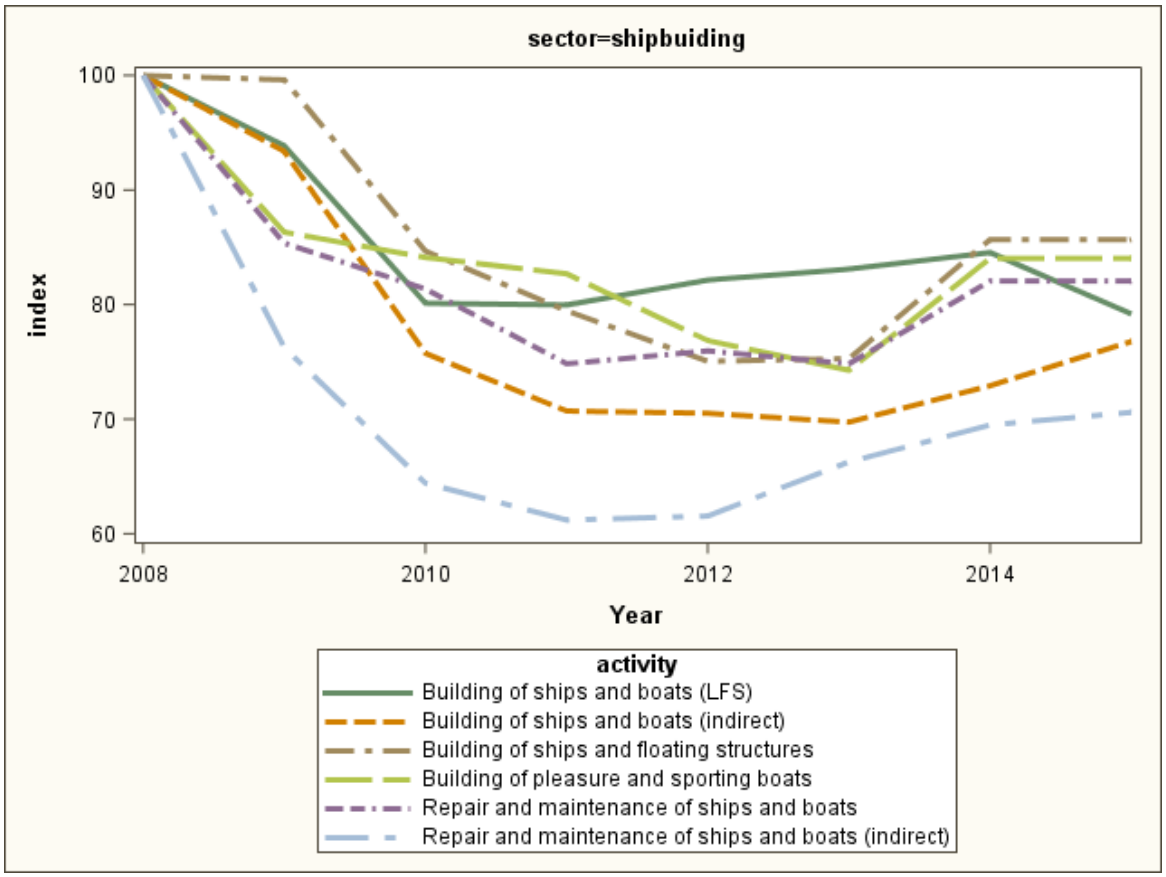

Figure 4 employment in shipbuilding (LFS indicates estimates using the Labour Force Survey)

Low prices for new merchant ships driven by overcapacity within important market segments is forcing global ship yards to focus attention on new markets and higher technology high added value products. They are currently mostly designed and built in Europe. European shipbuilders are reducing costs and restructuring capacities by adapting the production programme and optimising the supply chain. Indeed Figure 8 indicates a significant drop in shipbuilding employment since 2008. The decline, particularly in Germany, Poland and Spain has not been offset by a slight increase in the UK.

Large container, tanker or bulk carriers are built in Asia and, in terms of tonnage, EU shipyards contribution to the global market is very small. However, in terms of value, particularly including naval shipbuilding, the European shipbuilding industry is a global leader. In 2016 it was second only to the USA in terms of the value of new orders. This reflects its focus on the construction of complex vessels such as naval vessels, cruise ships, ferries, mega-yachts, and dredgers. In 2015, of the 32 cruise ships on firm order, 30 were being built in Europe[142]. The drop in oil price and the subsequent reduction in investment has had an impact on the European construction of offshore platforms and supply vessels..An increasing proportion of the yards' turnover is from military orders –particularly in France, Germany, Italy, Spain the United Kingdom (figure 9). In 2015, naval orders represented two thirds of shipbuilding orders

[142] "Riding the wave" Economist, 27 June 2015

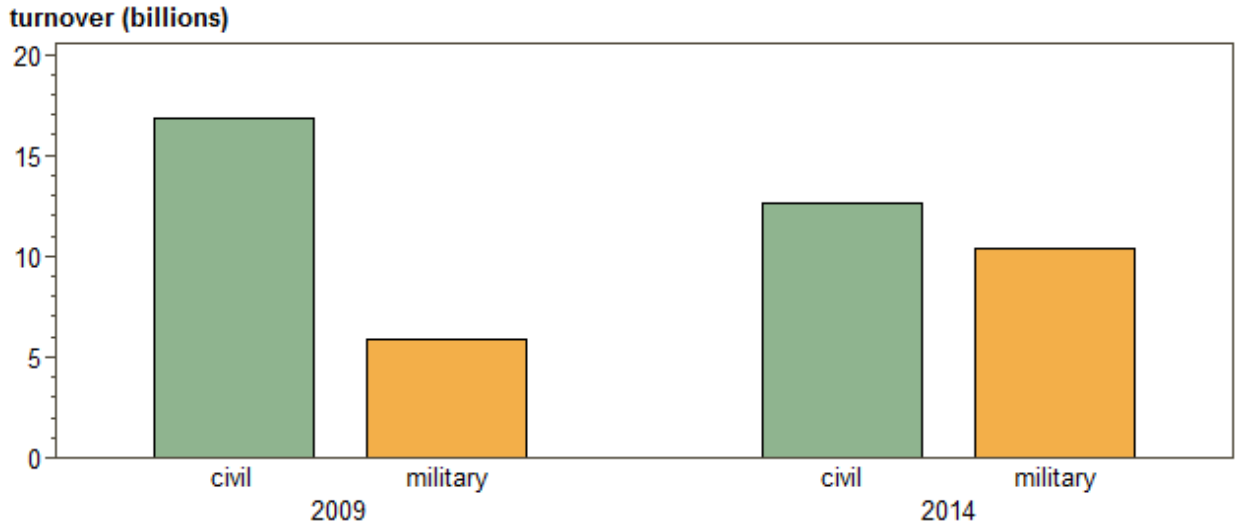

Figure 5 civil-military split in shipbuilding turnover – comparison 209 with 2014

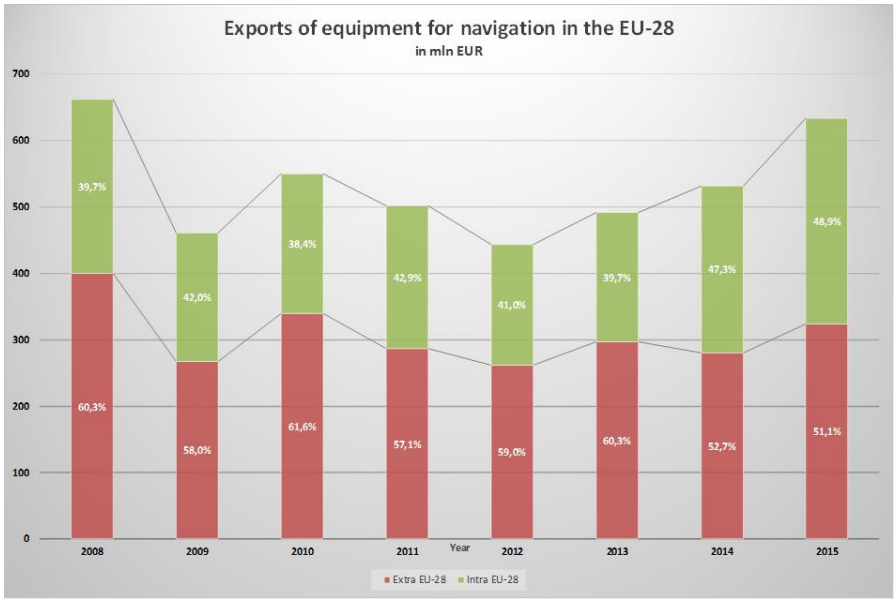

Figure 6 exports of marine equipment

The marine equipment industry is also globally competitive representing just under 50% of the global market Many Asian vessels include significant components of high-technology equipment built in Europe; for instance in propulsion or navigation equipment (Figure 6) However, the huge overcapacity on all major cargo shipping markets caused by massive ordering during the boom period and slow growth of transport demand in recent years squeezes the equipment manufacturers. Furthermore, maintaining this market requires continual innovation because shipbuilders are aiming to increase the share of home grown components and create high-value-added employment opportunities for themselves

6.1.2 Transport

Shipping carries 75% of Europe's external trade by volume and just over 50% by value[143]. About 30% by tonne-kilometres of freight within and between EU Member States is carried by sea. These proportions have remained relatively constant overt the past 20 years.

	Turnover (billion euro)	employment
Construction of water projects	14	83,000
Water transport services (indirect)	.	250,000
Sea and coastal passenger water transport	19	73,000
Sea and coastal freight water transport	89	93,000
Inland passenger water transport	2	18,000
Inland freight water transport	5	23,000

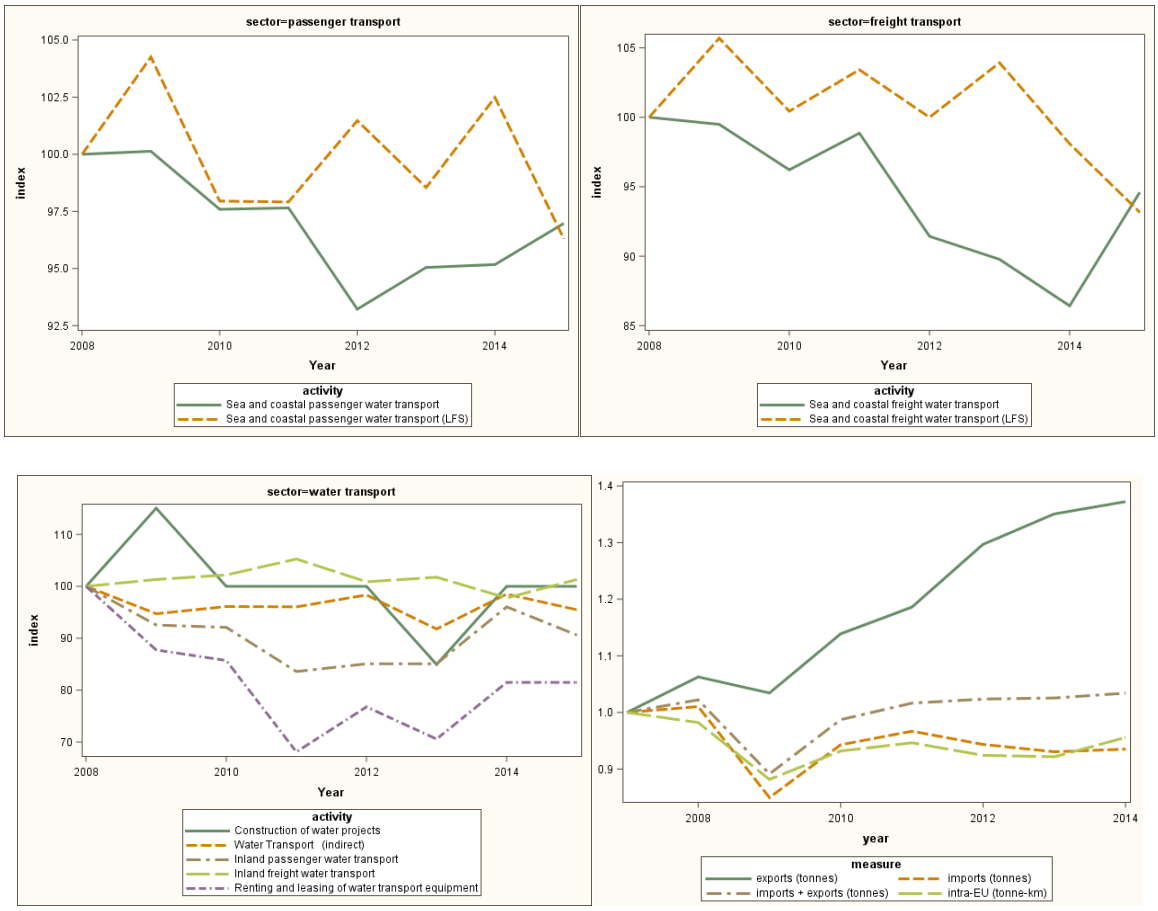

Figure 7 employment in maritime transport (LFS indicates estimates using the Labour Force Survey) and volumes of trade

143 Eurostat statistical pocketbook 2016, EU transport in figures.

Although the volume of trade has picked up from the low point in 2009, employment has not yet reached its pre-crisis levels (Figure 7). Investment automation in logistics and shipping will increase the competitiveness of shipping against other forms of transport, particularly in short sea-shipping but is unlikely to increase employment.

6.1.3 Non-living resources

	Turnover (billion euro)	employed
Petroleum and gas extraction (indirect)	.	424,000
Extraction of crude petroleum	57	44,000
Extraction of natural gas	103	30,100
Support activities for petroleum and natural gas extraction	16	53,900

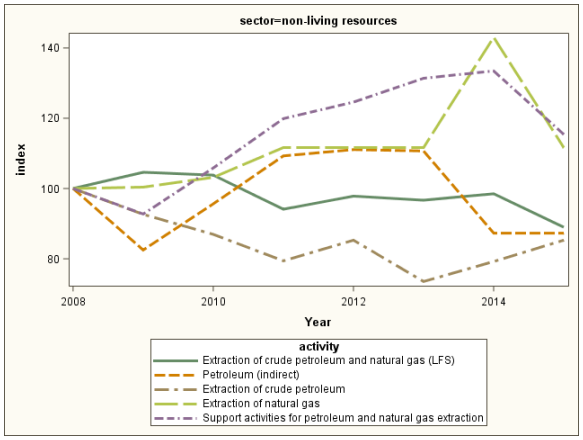

Figure 8 employment

Figure 9 End of day Commodity Futures Price Quotes for Crude Oil Brent (NASDAQ)

The offshore oil industry has for many years been a driver for offshore and underwater engineering innovation as activity has moved into deeper and deeper waters[144].

Most employment is in industries providing goods and services to the oil companies themselves. For instance the offshore oil industry is the largest civilian market for helicopter services. Activity fluctuates with the price of oil.

144 It is not possible at the moment to separate offshore from onshore oil exploration and production in terms of production, investment or employment but the industry report that nearly all is offshore

6.1.4 Living resources

		Turnover (billion euro)	value added	employed
Fisheries and aquaculture	supply of goods and services	.	.	77,000
Fisheries	distant water fleet	1	0.3	7,000
	large scale fleet	5	2,3	74,000
	small scale fleet	1	0.6	84,000
Aquaculture	finfish salt water	1	0.2	5,000
	shellfish	1	0.5	40,000
	finfish fresh water	1	0.2	15,000
Processing	supply of goods and services	.	.	95,000
	processing and preserving	24	4.0	116,000
Retail	in specialised stores	6,	1.2	71,000

In fisheries, future employment will depend on effective conservation of the stocks on which the industry depends and the split between the large scale and small scale fisheries. About half of all fishermen in the EU are employed in small-scale fisheries whilst their production in value terms is about five times less than that of the large scale fleet. All other factors being equal, measures such as quota allocation that favour small-scale fisheries at the expense of large scale fisheries will increase employment.

The aquaculture industry is not large and is dominated by small and medium enterprises and family businesses. This makes the collection of data from the industry unreliable and accounts for much of the fluctuation seen in Figure 10. The Labour Force Survey data, which are more stable, indicate a downward trend, which for more or less constant production, suggests gains in productivity.

There is rather good agreement between structural business statistics and labour force survey data on the slight decrease in employment in seafood processing. This is a significant employer at a national level for the Baltic States. Norwegian fish are processed here in order to avoid the import tariffs – which are higher for processed than fresh fish.

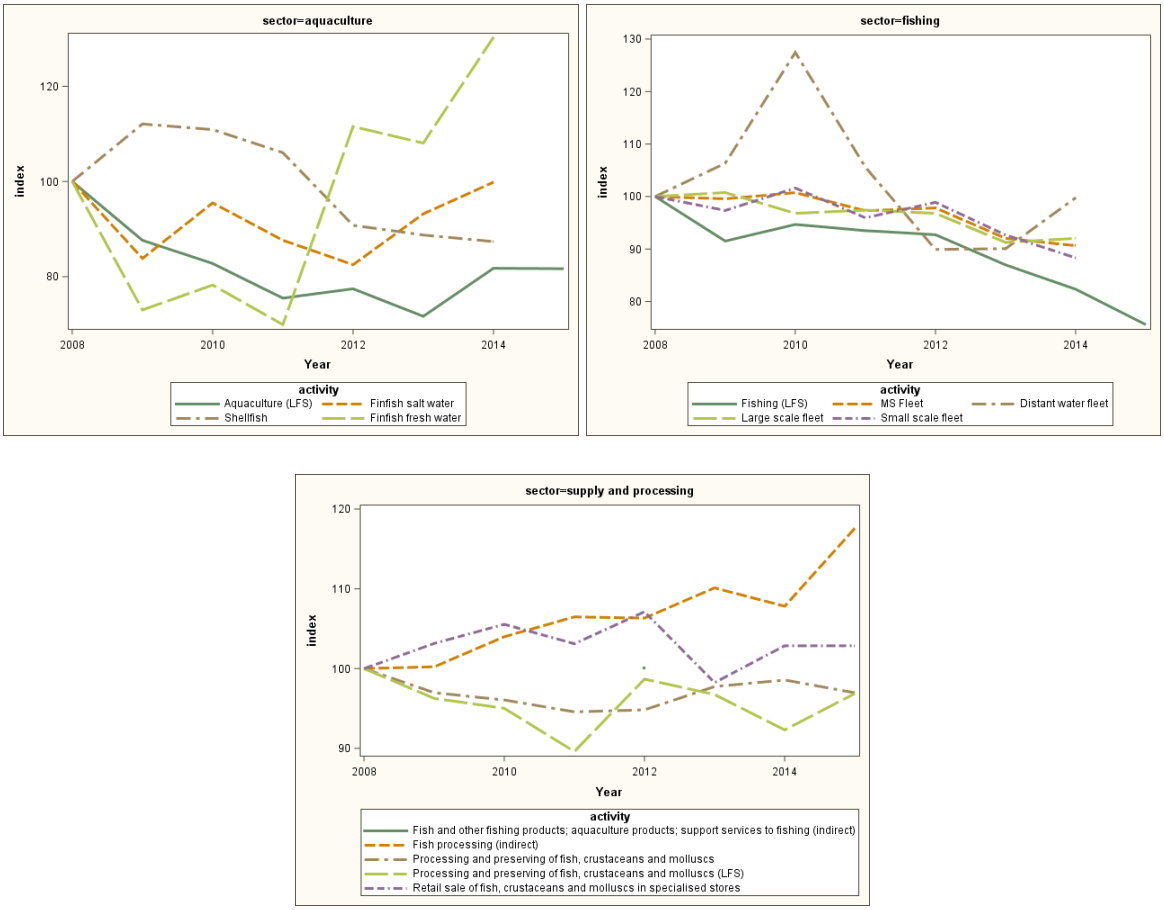

Figure 10 employment trends (data from structural business statistics and Labour Force Survey for processing, Data Collection Framework and Labour Force Survey (LFS) for fishing and aquaculture." MS fleet" includes small scale, large scale and distant water fleets.

6.1.5 Coastal 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. 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[145]. The figures indicate a steady growth in these 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. For tourists from the same country, most visitors arrive by motor vehicle. For non-residents it is mostly by air.

[145] The numbers presented here are derived from Eurostat's tourism statistics of tourism spending and night spent in coastal municipalities. Structural business statistics are used to estimate the ensuing employment. The challenge is to relate the estimates of spending which are collected at tourists' place of residence to the location at which the spending took place.

		annual tourist spending (euro)	employed
Accommodation	hotels or similar establishments	37,800,000,000	597,000
	other	12,000,000,000	236,000
	campsites, caravan or trailer park	4,800,000,000	57,200
Transport	air	21,600,000,000	60,000
	bus, coach	1,380,000,000	26,200
	motor vehicle	15,600,000,000	40,700
	land	21,200,000,000	326,000
	railways	3,970,000,000	24,500
	waterway	1,460,000,000	8,390
	other	636,000,000	7,570
Other	durables and valuable goods	9,350,000,000	81,000
	restaurants and cafés	15,700,000,000	381,000
	other expenditures	38,100,000,000	359,000

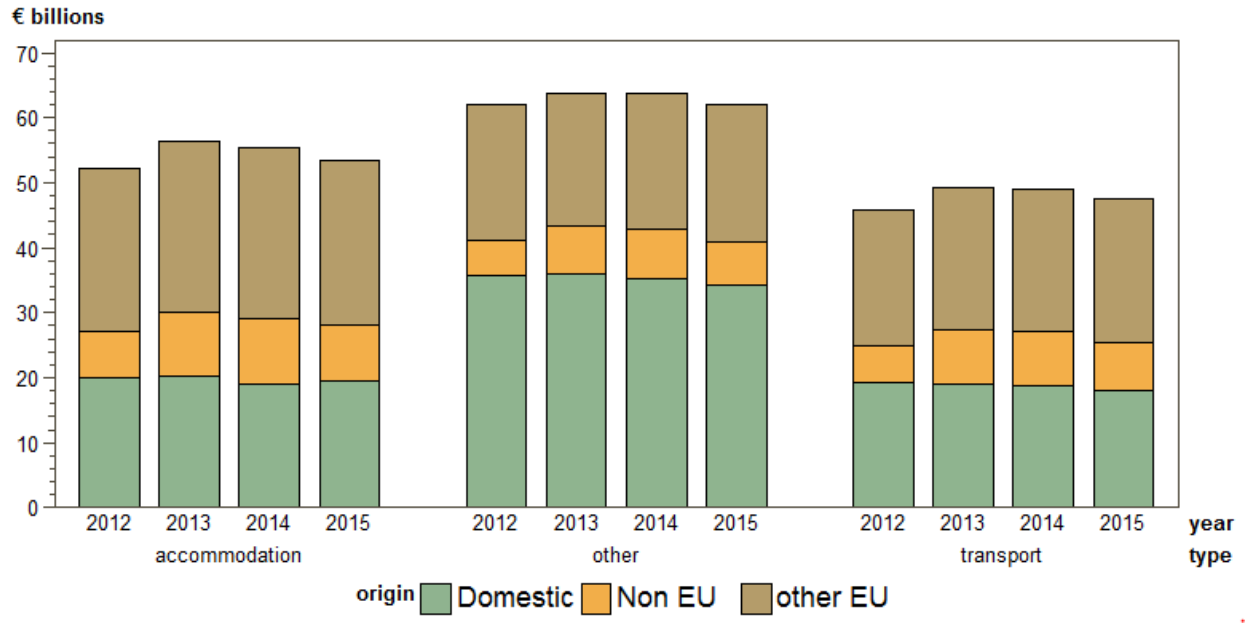

Figure 11 Spending of tourists in coastal regions of the EU. The 2015 figures are provisional and wil be updated in the final version of this document

6.1.6 Renewable energy

The number of turbines installed offshore is growing in absolute terms and also as a proportion of the total number of turbines installed. Employment in their manufacture, installation, operation and maintenance has been growing very strongly.

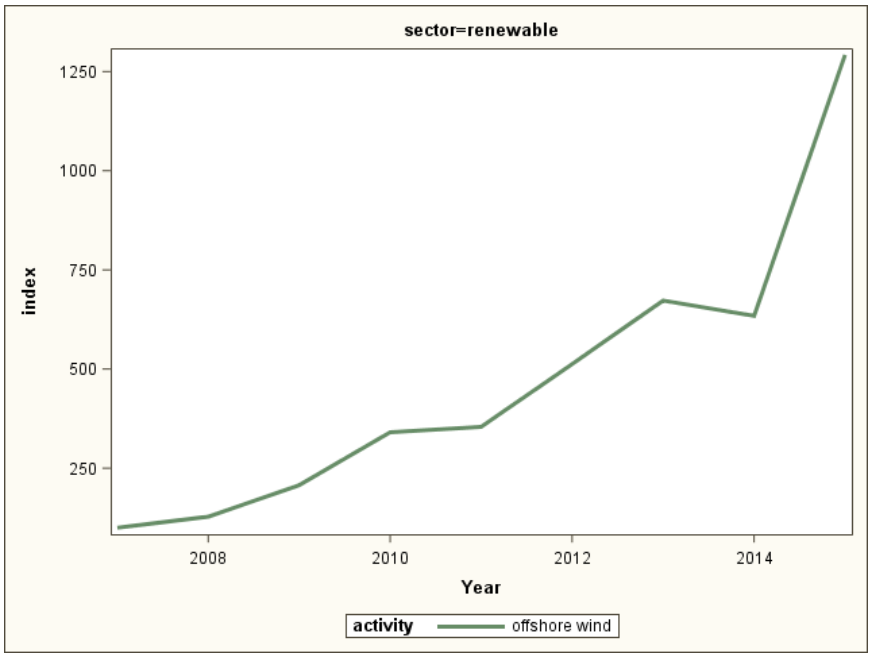

Figure 12 Employment expressed as an index