

THE EU BLUE ECONOMY REPORT. 2019



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FOREWORD



"Throughout the course of my mandate in the European Commission, I have strived to bring the sustainable use of our ocean to the forefront of our agenda. In this work, I have been greatly helped by the fact that my portfolio combines, for the first time, both the maritime and the environmental agenda. By combining our blue planet potential with green planet planning, we have raised the profile of the blue economy.

Now more recognised internationally than ever before, the EU's Blue Economy is indispensable to our future welfare and prosperity. As a source of food, energy, transport or leisure, and as a driver for new jobs and innovation.

The Blue Economy is evolving rapidly, affecting both traditional and emerging sectors – as well as the surrounding communities. For example, wind energy employment was up 14% in just one year (2016-17). Likewise, coastal tourism or port activities are growing well above trend. This creates new opportunities for our societies, but also raises the stakes, to ensure a development where higher growth goes hand-in-hand with preserving our seas and their resources for generations to come.

One condition, among others, for enabling successful blue growth is the availability of better data, analysis and knowledge about the sea and the use we make of it. Therefore, the European Commission is now publishing the second edition of its EU Blue Economy Report (2019).

The new edition incorporates more data on innovative and emerging sectors (renewable energy, desalination, blue bio economy etc.) and consolidates data and analysis for the more traditional sectors (shipbuilding, transport and coastal tourism). It is my wish that this report will continue to evolve in the years to come – as does the Blue Economy that provides a living to so many of our citizens.

Our goal for this new edition is to illustrate more accurately the size and impact of the Blue Economy in the European Union, and I am pleased to say that we have taken solid steps in this direction. I am proud of our shared work in developing this body of work and excited about the future opportunities that the ocean will deliver"

**Karmenu Vella, Commissioner for Environment,
Maritime Affairs and Fisheries**



"Ours is a blue planet because the oceans and seas that cover almost three quarters of the Earth's surface reflect blue light into space. That, in itself, shows the significance of the marine environment. It is the largest ecological area, or biome, on Earth. It is highly structured, diverse, and complex. It underpins the prosperity and wellbeing of billions of human beings. It is also very fragile.

Our knowledge about oceans remains limited. This lack of understanding prevents us from making the most of our ocean resources without harming marine ecosystems.

This second EU Blue Economy Report aims to help us change that. It reflects the importance that the European Commission attaches to a robust, evidence-based approach to using oceans and seas in tackling the challenges facing humanity and to creating prosperity without endangering that of future generations.

This year's edition goes beyond looking at established sectors of the economy, investigating the opportunities offered by emerging sectors such as wind farms and blue biotechnology, which have experienced fast growth in recent years. It finds that European leadership in these sectors depends on intensive research, technology development and innovation.

The report also highlights how urgently we need to act to keep our oceans healthy. This is critical if we are to preserve and increase the natural capital that benefits ecosystem services and economic sectors. The crucial role of oceans and seas is probably most evident in their dominant role with respect to the Earth's climate and as the largest active carbon sink.

Its unique and comprehensive approach makes the Blue Economy Report an indispensable source of information for a wide variety of stakeholders: policy makers, blue economy experts, industry, as well as scientists and citizens.

I hope that the 2019 Blue Economy Report will help us develop better policies, guide our investment priorities, but also identify research and innovation needs, helping us fill knowledge gaps and drive technology development. But first of all, I hope you find it an inspiring read."

Tibor Navracsics, Commissioner for Education, Culture, Youth and Sport, responsible for the European Commission's in-house science and knowledge service, the Joint Research Centre

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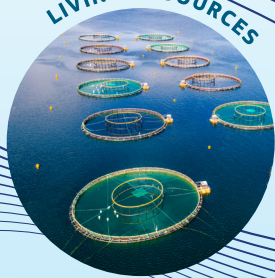
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BLUE ECONOMY

All economic activities relating to the oceans, seas and coasts. Blue Economy covers a wide range of interlinked established and emerging sectors.

LIVING RESOURCES



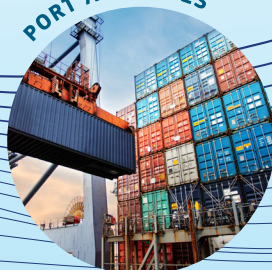
MARITIME TRANSPORT



SHIPBUILDING & REPAIR



PORT ACTIVITIES



COASTAL TOURISM



NON-LIVING RESOURCES



MARINE MINERALS



DESALINATION



BLUE ENERGY



BLUE BIO ECONOMY



MARITIME DEFENCE



MARITIME SECURITY



MARINE DATA



MARITIME SPATIAL PLANNING



SHARED INFRA-STRUCTURE



ENVIRONMENTAL PROTECTION



COMMON SKILLS



EXECUTIVE SUMMARY

The EU Blue Economy Report analyses the scope and size of the Blue Economy in the European Union, solidifying a baseline to support policymakers and stakeholders in the quest for a sustainable development of oceans, sea and coastal resources.

For the purposes of this report, **by Blue Economy, we understand** all those activities that are marine-based or marine-related. Therefore, the Report examines not only established sectors (meaning those that have traditionally contributed to the Blue Economy) but also emerging (those for which reliable data are emerging) and innovative sectors, which bring new opportunities for investment and hold huge potential for the future development of coastal communities. The Report describes the most recent trends in several socioeconomic indicators and analyses the drivers behind such trends. Analyses are provided for the EU as a whole and by sector and industry for each Member State.

While there are still many challenges to be faced, **this Report intends** to serve as a useful step in assessing the potential of oceans and coasts in leading to sustainable economic growth and seeks to support the development of management policies that will ensure this. Hence, the importance of discussing the need to maintain healthy oceans that help preserve and increase the natural capital from which ecosystem services are produced.

The second edition of the Report includes the following **improvements and new elements**:

- Inclusion of additional maritime sub-sectors and activities such as marine equipment and machinery (in Shipbuilding and repair) and prepared seafood meals and manufacture of seafood oils and fats (in Marine living resources), and a maritime defence.
- A more detailed and extensive analysis on emerging activities (desalinisation, blue (renewable) energy and blue bio economy).
- A new chapter on natural capital and ecosystem services, which also includes an analysis on the impact of climate change and the costs of mitigating measures, as well as the costs of ocean litter.
- New case studies on marine protected areas, ocean observation, indirect employment generated by the Blue Economy and the role of the EIB in supporting investment in the Blue Economy.
- A regional analysis offering an overview of the main socioeconomic features of the various EU sea basins and examples of smart specialisation.

The Blue Economy established sectors include the following six sectors: Marine living resources, Marine extraction of non-living resources, Maritime transport, Port activities, Shipbuilding and repair and Coastal tourism. The analysis of these sectors is based on the data collected by the European Commission through Member States and the European System of Statistics. Fisheries and aquaculture data were collected under the EU Data Collection Framework. Analyses for all other established sectors are based on Eurostat data from Structural Business Statistics (SBS), PRODCOM, National Accounts and tourism statistics.

According to **the most recent figures**, the established sectors of the EU Blue Economy directly employed over 4 million people, generated €658 billion of turnover and €180 billion of gross value added in 2017¹ (Table 1). The evolution of the Blue Economy² has been significantly influenced by general macroeconomic developments, in particular the global financial and economic crisis of 2008-2009. High growth rates can be observed in traditional sectors as well as the emerging ones. For the former, GVA data shows an acceleration in the growth of all sectors from 2013 onwards except for the Extraction of non-living resources. Indeed, GVA for Coastal tourism, Marine living resources and Port activities has grown by over 20% over the last decade. On the contrary, GVA in the Offshore oil and gas sector has seen a decrease of 34%, influenced by the drop in oil prices and the reduction in the extraction of the most costly (offshore) sites. The Marine transport sector has also seen a decline, albeit a softer one (3%). Employment between 2009-2017 has mostly seen growth in both the Coastal Tourism (10%) and Port activities (25%) sectors. For Shipbuilding and repair as well as for Maritime transport, employment has grown with respect to the minimum observed in 2013-2014, but has not yet recovered to 2009 levels. Anecdotal evidence suggests that Maritime Spatial Planning (MSP) might already be having a positive impact in investments on a number of maritime sectors and MS (e.g. Germany, Netherlands, and Belgium).

1. Figure for 2017 are provisional and may be subject to revision in upcoming Reports.

2. The report focuses on the evolution of the EU Blue Economy over time. The differences in the figures with respect to last year's report can be explained by a combination of real growth and the statistical effect of including additional sectors.

Table 1 EU Blue Economy established sectors, main indicators, 2017

Indicator	EU Blue Economy 2017
Turnover	€658 billion
Gross value added	€180 billion
Gross profit	€74.3 billion
Employment	4 million people
Net investment in tangible goods	€14.9 billion
Net investment ratio	24%
Average annual salary	€26,400

Notes: Turnover calculated as the sum of the turnover in each sector; it may lead to double counting along the value chain. Nominal values. Direct impact only. Net investment excludes maritime transport and coastal tourism. Net investment ratio is defined as net investment to GVA.

Source: Eurostat (SBS), DCF and own calculations.

The Blue Economy emerging and innovative sectors include blue energy, i.e. offshore wind energy, ocean energy (wave and tidal), blue bio economy and biotechnology, marine minerals, desalination and maritime defence. These sectors offer significant potential for growth and jobs, especially in renewable energies. Offshore wind for instance has seen an exponential growth, which has led to a similar increase in jobs in EU coastal communities. In 2008, offshore wind was responsible for 20,000 jobs, which has risen to 210,000 in 2018. The sector has not only created employment but has also, much like ocean energy and desalination, attracted investments. Likewise, employment in the Blue bio economy sectors has reached over 17,000 jobs (including indirect activities). Moreover, turnover stands at €1.5 billion for direct activities (with an additional €240 million in ancillary activities). Another illustrative example, included in a case study within the report, shows that marine research and education has a positive economic impact in the local coastal economies.

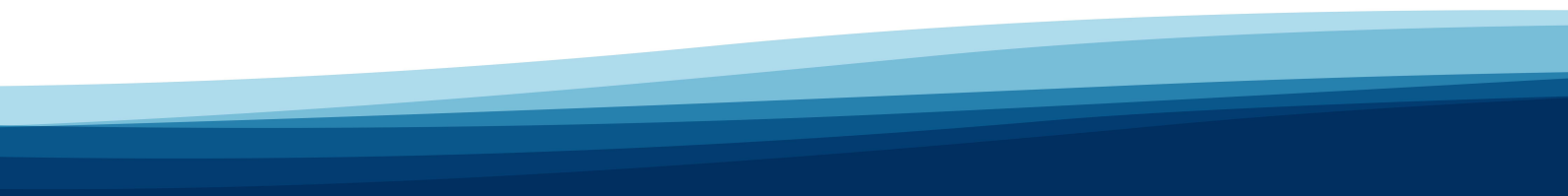
Preserving and increasing the **natural capital** accumulated in the seas and oceans is critical for them to deliver sustainable **ecosystem services** and for the EU to achieve the Sustainable Development Goals (SDGs) set by the UN for 2030. The Marine Strategy Framework Directive provides a comprehensive, holistic approach to the protection of European Seas, acting as the environmental pillar of the wider EU Maritime Strategy. The deterioration of the seas may have disastrous consequences through not only the impact of climate change and the increasing costs to mitigate its consequences, but already today as a result of nutrients and marine litter on the surface, water column and seabed. In fact, marine litter is already generating costs and lost revenues in sectors like fishing, aquaculture, tourism and government estimated at almost €11 billion a year. The negative economic impact of climate change in the form of coastal flooding in the EU is estimated

to reach between €12 billion and €40 billion a year by 2050 and to affect between 500,000 and 740,000 EU citizens, depending on the scenario.

The Blue Economy is interconnected with many other activities in the economy and its impact goes beyond the sectors mentioned above. A series of case studies in this Report illustrate some of the wider scope of the Blue Economy. The analysis of a major German shipyard shows the actual economic impact of shipbuilding: for each 100 jobs in the shipyard a total of 560 jobs were created when indirect and induced effects were taken into account. Under the Copernicus marine environment monitoring Service the European Union provides a significant amount of data to the wider public. This data helps prevent risky investments and improves business certainty in sectors as diverse as fishing, aquaculture, energy or shipping. Although Marine Protected Areas (MPAs) are a policy tool for conservation, another case study shows how they can provide benefits to the Blue Economy through a number of different mechanisms. The importance of the Blue Economy varies significantly across the EU; another case study shows its importance in West Brittany (France), with a special focus on marine research and education. In order to develop many activities in the Blue Economy, significant upfront investments may be required. Another case study shows how the European Investment Bank (EIB) is supporting a number of established and emerging sectors in the Blue Economy by providing funds for activities such as fishing, aquaculture, shipping, biotechnology, coastal tourism or blue energy. Overall, the EIB has provided financing for over €20 billion in the last ten years. Projects to be funded are assessed against their potential multiplicative effect and their sustainability (e.g. reduction in the environmental impact).

For the first time, this Report comprises an overview of the EU sea basins. Almost 45% of the EU population (214 million people) live in coastal regions. Coastal regions in Northern countries (Atlantic and North Sea) tend to have a higher GDP per capita than Southern regions (Mediterranean and Black Sea). Since 2014 and as part of the EU Cohesion Policy, Smart Specialisation was created, as an innovative place-based policy approach that aims to boost growth and jobs at regional, national and European levels by identifying and developing competitive advantages in innovation niches. Success stories in the Blue Economy can be an example for other regions in the EU. These include marine biotechnology in Brittany (France), tourism, health services, wind energy, fish farming and boat building in Ida-Viru (Estonia), and maritime technologies, specialised ship construction, offshore energy, and maritime biotechnology and production facilities in Schleswig-Holstein (Germany).

CHAPTER 1: **INTRODUCTION**



The ocean covers 71% of the Earth's surface and ocean and coastal ecosystems provide human beings with considerable economic and environmental services as well as impressive natural capital. Besides the traditional exploitation of living resources (fishing, aquaculture and the processing sector), a broader vision of the Blue Economy can offer important sources of economic development for MS economies and coastal communities in particular. Although its scope is still evolving, this report, encompasses some established and an increasing number of emerging and innovative sectors.

A sustainable Blue Economy allows society to extract value from the oceans and coastal regions. However, this extraction needs to be in balance with the long-term capacity of the oceans to endure such activities through the implementation of sustainable practices. This implies that human activities must be managed in a way that ensures the health of the oceans and where economic productivity is safeguarded, so that the potential they offer can be realised and sustained over time.

Further, measurements of economic progress alternative to GDP and GVA have already been proposed and used in many sectors of the economy. Water pollution costs (e.g. plastics), overexploitation of living and non-living resources; the carbon footprint and the contribution to climate change by maritime activities needs to be accounted for to ascertain that current and future maritime activities are sustainable. This report includes a section on natural capital and ecosystem services as well one on adaptation to climate change, which highlights the cost of protecting coastal ecosystems and activities.

What does the Blue Economy include?

For the purpose of this report, the EU's Blue Economy encompasses all sectoral and cross-sectoral economic activities related to the oceans, seas and coasts, including those in the EU's outermost regions and landlocked countries. This includes the closest direct and indirect support activities necessary for the sustainable functioning and development of these economic sectors within the single market. It comprises emerging sectors and economic value based on natural capital and non-market goods and services. This definition is fully in line with the definitions adopted by the OECD³ and the World Bank⁴.

The report compiles the data on the economic activity emerging directly from the identified sectors. However, some Blue Economy sectors generate significant indirect and induced economic

effects. At times and where possible, these effects are incorporated into other Blue Economy sectors.

Although not enough information is currently available to comprehensively estimate indirect and induced effects, the report includes a specific case study, which illustrates the wider impact of certain maritime activities.

This second edition of The Blue Economy Report, takes stock of the progress in the six established sectors, i.e., those that have traditionally contributed to the Blue Economy⁶:

- Extraction and commercialisation of marine living resources (i.e. Marine living resources).
- Marine extraction of minerals, oil and gas (Marine non-living resources).
- Maritime transport.
- Ports, warehousing and construction of water projects (Port activities).
- Shipbuilding and repair.
- Coastal tourism.

The report also looks into various emerging and innovative, sectors: Blue energy (including offshore wind energy and ocean energy), Blue bio economy, Marine minerals, Desalination and Maritime Defence⁶.

This second edition seeks to further depict the sector and to more accurately report data to encourage data collection, monitoring and measuring of all sectors, particularly the innovative ones. In concrete terms, this edition of the report incorporates the following new elements to provide a better insight of the EU Blue Economy:

Additional activities included in the analysis of established sectors comprise marine equipment and machinery within the Shipbuilding and repair sector. The Marine living resources sector now includes data on prepared seafood meals and on the refining of seafood-derived oils and fats.

Under the **sectors with emerging data**, the report incorporates an analysis on Defence. It also provides more detailed data and a subsequent analysis on sectors such as desalination, renewable energies and blue bio economy. Finally, the report expands its analysis of coastal and environmental protection.

A chapter on **natural capital and ecosystem services** highlights the importance of maintaining the ocean system in good health and the significant economic impact that its degradation can have in the future.

The **case studies** complement the section on emerging sectors with a detailed analysis on marine research and education and the impact of marine protected areas. It also provides an example of indirect and induced activities generated by the Blue Economy in certain established sectors.

3. OECD (2016). The Ocean Economy in 2030, OECD Publishing, Paris. <http://dx.doi.org/9789264251724-en>. For the OECD, 'the ocean economy encompasses ocean-based industries (such as shipping, fishing, offshore wind and marine biotechnology), but also the natural assets and ecosystem services that the ocean provides (fish, shipping lanes, CO2 absorption and the like)'.

4. World Bank and United Nations Department of Economic and Social Affairs. 2017. The potential of the Blue Economy. Increasing long-term benefits of the sustainable use of marine resources for small island developing states and coastal least developed countries. World Bank, Washington DC: 'the 'Blue Economy' concept seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans and coastal areas'.

5. A detailed methodology explaining how the data for these established sectors has been compiled is discussed in Annex II.

6. Defence and security is considered an emerging sector in that data are currently starting to emerge. It is not so much a new activity as it is one where the economic impacts have begun to be considered for the purpose of the Blue Economy.

The report includes a chapter on **regional analysis**, which provides an overview of the main socioeconomic features of all EU sea basins and some examples of smart specialisation.

Finally, the Report develops the analysis of the **underlying factors** driving the evolution of the EU Blue Economy. Aside from details for each sector, an overview of the general macroeconomic situation as well as the influence of global financial markets over the trends in financing and investments has been incorporated.

The report focuses on the evolution of the EU Blue Economy over time. The differences in the figures with respect to last year's report can be explained by a combination of real growth and the statistical effect of including additional sectors. For instance, last year showed 3.5 million jobs for the EU Blue Economy established sectors and this year the data showed 4 million jobs. This is partly due to an increase in scope and improved methodology and partly due to actual economic growth. Differences for aggregated turnover are larger as a result of double counting effects within the various value chains of the Blue Economy (e.g. fishing – processing – commercialisation, marine equipment and machinery – shipbuilding – maritime transport).

Aim of the Report

The Blue Economy's long-term potential in terms of jobs, growth and investments can only be completely realised if more effective and coordinated steps are taken to bring together environmental, economic and social aspects of ocean management. This assessment of the state and scope of the Blue Economy and investment opportunities is intended to support policy and decision-making, and provide direction in ocean stewardship and governance.

Building on existing datasets, the report aims at providing consistent information and analyses across the EU Blue Economy (established sectors). It is intended to encourage the continuous collection of harmonised, reliable and accurate data across Member States through the European Statistics System (i.e. National Statistics Institutes and Eurostat).

A delineation of the Blue Economy largely depends on the sectors included and the extent to which indirect upstream and downstream effects can be identified and measured. Hence, deciding what sectors and activities to include when analysing the current state and size of the Blue Economy, is an important first step. For the purposes of this report, Blue Economy includes economic activities that are:

- Marine-based, including those undertaken in the ocean, sea and coastal areas, such as

capture fisheries and aquaculture, offshore oil and gas, offshore wind energy, ocean energy, desalination, shipping and marine transport, and marine and coastal tourism.

- Marine-related activities which use products and/or produce products and services from the ocean and marine-based activities; for example, seafood processing, marine biotechnology, shipbuilding and repair, port activities, equipment.

Yet the Blue Economy also includes those parts of the public sector with direct coastal and ocean responsibilities (defence, environmental protection, etc.), as well as marine education and research. The ocean also has an economic value that is hard to quantify, in terms of habitats for marine life, carbon sequestration, coastal protection, waste recycling and storing, and processes that influence climate and biodiversity.

After this introductory chapter, which includes also a literature review, the report is organised as follows: Chapter 2 presents a broad overview of the socio-economic impact of the Blue Economy for the six established sectors at EU aggregated level and provides some general information on the trends and drivers. This chapter is complemented with Chapter 3, which offers a detailed insight into the current status and recent trends for the six established Blue Economy sectors by diving into their sub-sectors and activities in different Member States. Based mostly on Eurostat and DCF data, this chapter provides a summary of the trends and drivers behind each established sector, and how they interact amongst each other.

Chapter 4 considers the available data on emerging and innovative sectors within the Blue Economy. They include blue energy, blue bio economy, marine minerals, desalination and maritime defence.

Chapter 6 discusses the significant value of natural capital and ecosystem services and the importance of maintaining the ocean system in good health.

Chapter 5 contains five case studies to illustrate, in the form of examples or best practices, certain Blue Economy elements, activities or sectors. **Chapter 7** provides a regional approach to the Blue Economy by compiling general socioeconomic data for the various EU sea basins and a smart specialisation approach oriented to discover innovation potential, especially in the emerging sectors of the Blue Economy.

Chapter 8 offers an overview of the Blue Economy for each of the 28 EU Member States. The report is complemented with **Annex I** that compiles the main economic data for the established sectors broken down by Member State. Finally, **Annex II** includes a detailed methodology on the calculations carried out to estimate the different economic indicators for the established sectors and a glossary with the main terms used throughout the report.

LITERATURE REVIEW

Background

Three of the main reports produced on Blue Economy by OECD, Cogea and Ecorys, served as a source of information and inspiration for the first edition of the EU Blue Economy Report⁷. However, studies and reports which seek to monitor, measure and analyse the Blue Economy and the encompassing activities have also been produced at both a national level (within and out with the EU), and at a regional level⁸. Below is a brief overview of these reports, their purpose and contribution especially in relation to the EU Blue Economy Report.

Indonesian Ocean Policy

The Ministry for Maritime Affairs of the Indonesian government has published “The National document of the Indonesian Ocean Policy”. This document serves as a basis on Ocean policy for both ministerial and non-ministerial government institutions. It details forms and guidelines in which to undertake the planning, monitoring, implementation and evaluation of developments and policies in the maritime sector.

L'Économie Maritime en Bretagne (the maritime economy in Brittany)

The regional government of Brittany in France recently published a report on the Blue Economy with key figures for the different sectors and activities, with the goal of informing policymaking through the production of accurate up to date data. The report quantifies and monitors the maritime activities and their socio-economic impact, to suggest a coherent and reliable methodology that is comparable across time and at town/village level. In terms of indicators, it focuses mainly on employment and number of companies, and includes sectors such as under water cables, and maritime insurance. Other sectors include research and education or defence (given the prominence of the French navy in Brest), which were not part of the first edition of the Blue Economy Report, but are covered in this edition. Finally, their main source of data are local and in-house networks of urban planning, Chambers of Commerce and Industry in Brittany, the Institut national de la statistique et des études économiques (INSEE) and the Direction interrégionale de la mer Nord Atlantique-Manche Ouest (DIRM-NAMO.). A further study was produced by the Agence D'urbanisme

Brest, the CCI Métropolitaine Bretagne Ouest (CCIMBO) and other local partners such as the Western Brittany University (UBO), which analyses the impacts of the Blue Economy sectors and activities in the Brest Area.

Dutch Maritime Cluster

Ecorys also produces a yearly report on the Dutch maritime cluster on behalf of the Ministry of Infrastructure and Environment and in collaboration with Stichting Nederland Maritiem Land. This report focuses especially on the established sectors including Maritime transport, Shipbuilding and ports. The aim of the report is to monitor and measure Blue Economy activities in order to inform stakeholders and policy makers and to ensure that decisions are made based on accurate and precise data. It attempts not merely to report figures, which are mostly derived from national statistics, but to explain the trends and drivers related to them.

Scotland's Marine Economic Statistics

The Scottish government recently published (October 2018) its own first economic report on the Blue Economy in Scotland: “Scotland's Marine Economic Statistics” for the period 2008-2016. It measures the size of the Blue Economy using common indicators such as employment, turnover and GVA. Additionally, the Scottish report uses SABS as its main source of data and DCF data for fisheries and aquaculture as does this report. Finally, the Scottish report highlights the fact that the emerging sectors (especially renewable energies) also contribute and have much potential, although not completely addressed due to a lack of data.

Ireland's Ocean Economy

The Socio-Economic Marine Research Unit (SEMRU) at the National University of Ireland Galway (NUIG) is funded by the Irish Government to report on Ireland's Ocean Economy annually. Working in partnership with the Irish Marine Institute. The objectives are to provide information on the current and future status and trends of the Blue Economy sectors in Ireland, to monitor the progress towards some of the targets set by the Government, and to improve previous data and/or methodologies. This report also separates

7. These reports have not been summarised in this literature review, as a summary was included in the first edition. This section details newly found literature, which was not addressed in the previous version.

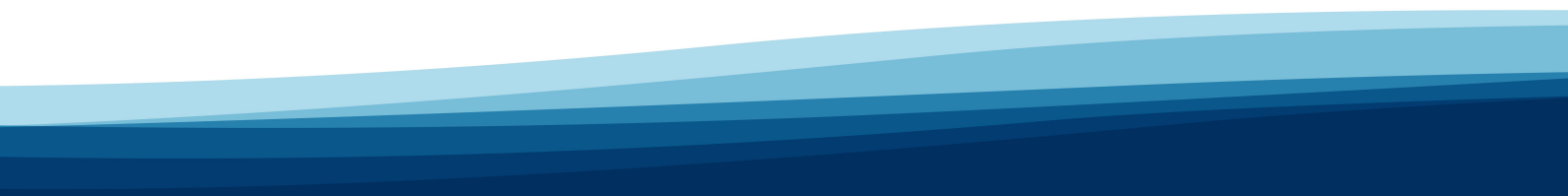
8. Here, regional should be understood here as regions within a country, not Sea basins

established from emerging sectors and uses most of the common indicators (e.g. GVA, employment, turnover etc.). Additionally, the report attempts to measure the impact of the indirect activities. The data contained in the Irish report comes mainly from Central Statistics Office (CSO), which has managed to combine CSO Business Demography (BD), Structural Business Statistics (SBS) and National accounts (Income Methods).

Building Industries at Sea: 'Blue Growth' and the New Maritime Economy

This book was published in 2018 and was written by experts with different backgrounds in relevant fields. The definitions used in this book are somewhat different to those contained in the Blue Economy Report, i.e. it defines established sectors as Blue Economy and emerging sectors as Blue Growth and does not include desalination, or the defence sector. Finally, the book categorises aquaculture as an emerging sector, whereas in this report it is mostly seen as established (addressed under living resources). It is only considered under the emerging sectors, when analysing blue bio economy/ biotechnology (algae biomass).

CHAPTER 2: **ESTABLISHED EU BLUE ECONOMY SECTORS**



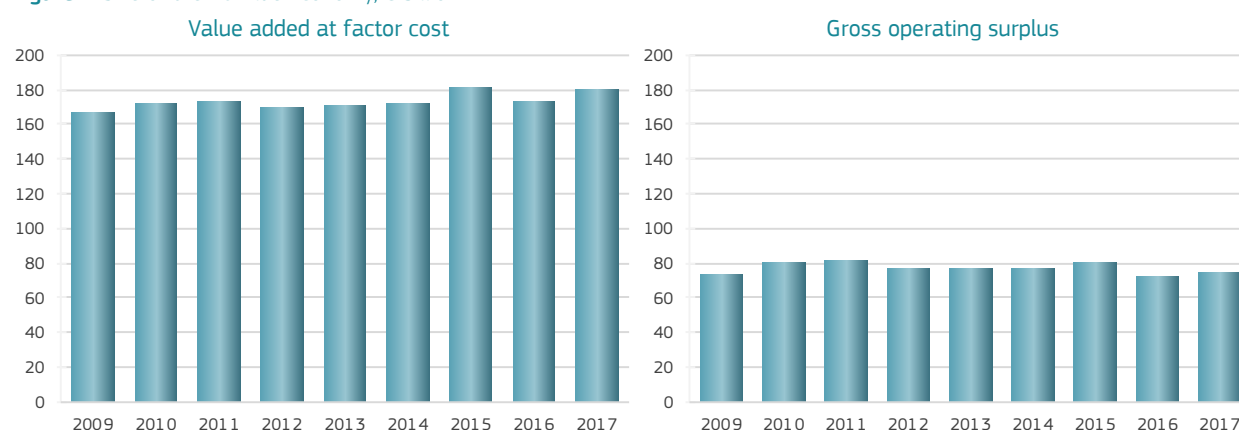
This chapter, provides an overview of the main economic indicators of the established sectors from an aggregated EU perspective. A detailed analysis for each one of the sectors is presented in chapter 3.

The gross value added (at factor cost, GVA) generated by the six Blue Economy established sectors covered in this Report amounted to €180 billion in 2017, an 8% increase compared to 2009. Gross operating surplus (profit), at €74.3 billion, was 2% higher than in 2009 (Figure 1). Total turnover⁹ was €658 billion, 11% more than in 2009.

These established Blue Economy sectors directly employed over 4 million people in 2017, a 7.2% rise compared to 2009 and 14% more than in 2014 (the lowest level reached in the period analysed). This increase was largely driven by Coastal tourism, which saw an 11.3% increase in jobs compared to 2009. Port activities, with an increase of 26%, also contributed to this positive trend.

Remuneration per employee for the EU Blue Economy established sectors increased steadily between 2009 and 2015, falling thereafter. However, with an average of almost €26,400 per employee, employment remuneration in 2017 was still 5.3% higher than in 2009 (Figure 2).

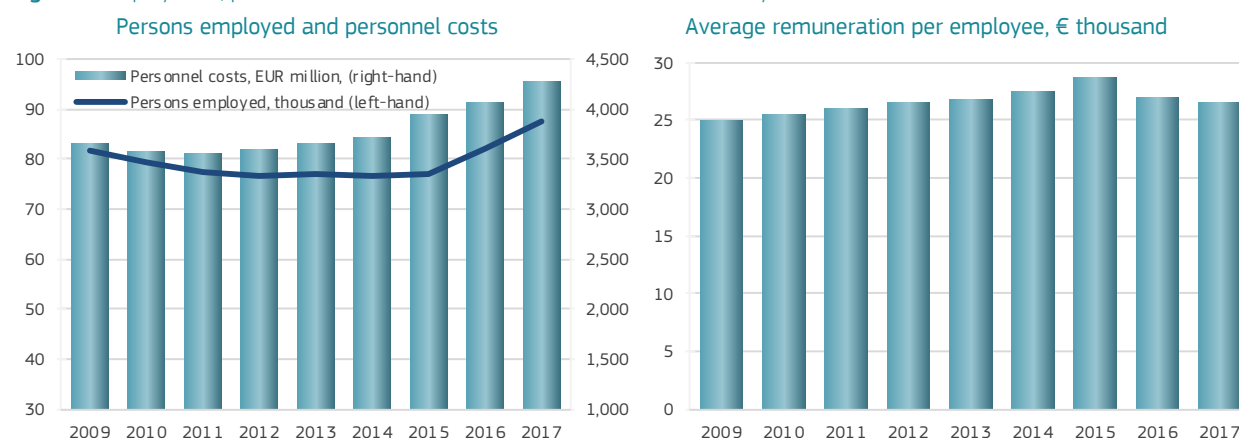
Figure 1 Size of the EU Blue Economy, € billion



Note: Data for 2017 are provisional.

Source: Eurostat (SBS), DCF and own calculations.

Figure 2 Employment, personal costs and remuneration in the EU Blue Economy



Note: Data for 2017 are provisional.

Source: Eurostat (SBS) and own calculations.

9. Considering turnover can lead to double counting along the value chain; this may particularly affect some sectors, such as Marine living resources and shipbuilding.

The decrease in average employment remuneration between 2015 and 2017 can be largely attributed to significant drops in the Extraction of non-living resources (-10%), more precisely, the extraction of crude petroleum (-14%) and support activities for petroleum and natural gas extraction (-21%) a sector that has been contracting for some years. Shipbuilding and repair also suffered (-5%), in particular, the sub-sector building of ships and floating structures (-6.5%). Furthermore, while the average wage decreased in several Member States from 2015 to 2016, the fall was most pronounced (-25%) in the UK Blue Economy, particularly dragged down by the reductions in the extraction of crude petroleum (-34%), but also from Ports activities, Shipbuilding and repair and Coastal tourism.

Investments in the EU Blue Economy were particularly impacted by the global financial crisis. Uncertainty about the financial position of banks and turmoil in financial markets hindered access to credit and many companies were forced to deleverage. Similarly, the European sovereign debt crisis hampered the capacity of governments to invest in large infrastructures with many projects delayed or even abandoned¹⁰.

Consequently, gross investments in tangible goods decreased by 32.7% compared to 2009: from €50.2 billion to €33.8 billion. The trend changed from 2013 to 2015, but did not hold, slumping again in 2016¹¹. As detailed in the following sections, the decline in gross investments was mainly driven by the Extraction of non-living resources, (-43.2% compared to 2009) in part due to the lower oil and gas prices on global energy markets. The

Marine extraction of non-living resources is the largest investor in the EU Blue Economy, having invested over €12.5 billion in 2017. Compared to 2009, gross investments in extraction of crude petroleum decreased by 49.8%, in the extraction of natural gas by 31.2% and in marine aggregates by 11.7%. Maritime transport, the second largest investor (€10.2 billion in 2017) also saw gross investments drop overall by 40.6% compared to 2009, affecting all its sub-sectors.

On the other hand, many of the investments in the Blue Economy concern large projects such as ports or Maritime transport and therefore usually have a long cycle with a lag of two to three years with respect to the recovery of the economy.

On the positive side, Shipbuilding and repair reported a positive trend with overall gross investments increasing a modest 2% compared to 2009, but with building of ships and floating structures increasing 11.5%, Marine equipment by +141% and machinery by +21% (specialised high tech sectors of the BE). Yet, their contribution to the Blue Economy is still small compared to the above sectors with decreasing investments.

Net investments in tangible goods¹², estimated at €14.9 million in 2017, also decreased (8.6%) compared to €16.3 million in 2009, and 23.2% compared to 2015 (€19.4 million invested). Despite this decrease, net investments remained positive, signalling a replacement and expansion of capital. The net investment ratio (net investment to GVA)¹³ was slightly steadier, ranging from 23% in 2009 to 24% in 2017, peaking at 28% in 2015 (Figure 3).

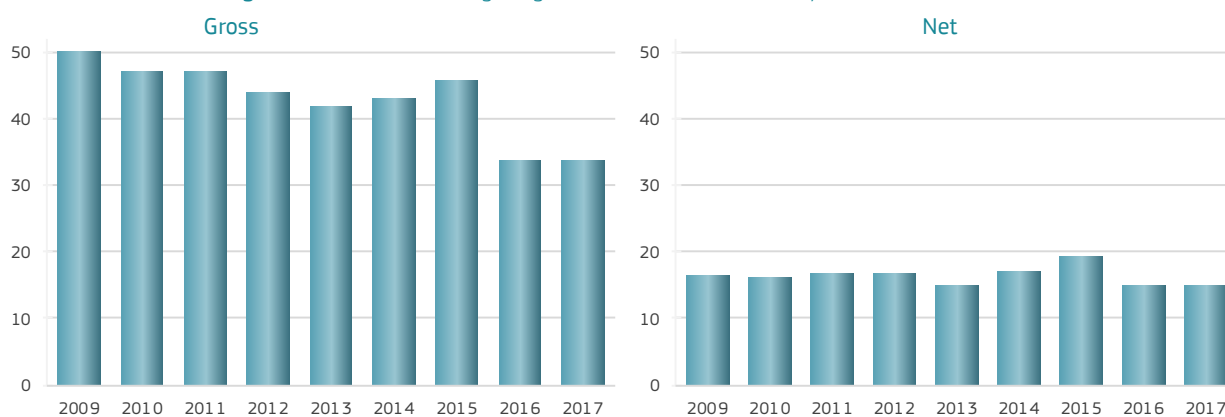
10. This "vacuum" in investments, in the EU but also globally, was used by the Chinese to launch the Belt and Road Initiative

11. Note that data for 2017 are provisional and the actual data is probably higher than currently available figures.

12. These figures exclude maritime transport and coastal tourism due to the lack of data.

13. These figures exclude maritime transport and coastal tourism due to the lack of data.

Figure 3 Investment in tangible goods in the EU Blue Economy, € billion



Note: Data for 2017 are provisional.
Source: Eurostat (SBS) and own calculations.

The Blue Economy established sectors in the context of the EU Economy

The EU-28 GDP¹⁴ was estimated at €13,750 billion in 2017 and employment at 222 million people. The Blue Economy established sectors contributed 1.3% to the EU economy and 1.8% to the EU employment, in 2017 the highest value over the time series (Figure 4).

The EU Blue Economy was significantly hit by the crisis with a decline in the absolute number of jobs and in the share of the overall economy. Thereafter, employment in the Blue Economy remained relatively stable until 2016 when it expanded again and reached a value 7% higher in 2017 than in 2009. The GVA generated by the established sectors in the Blue Economy stagnated between 2010 and 2016 (with a short hike in 2015). Provisional figures for 2017 point to an expansion of GVA. As for investment, this sluggish dynamism of the EU Blue Economy is mainly dragged down by the slowdown in the Extraction of oil and gas, while the rest of the established sectors performed much better (see below for details).

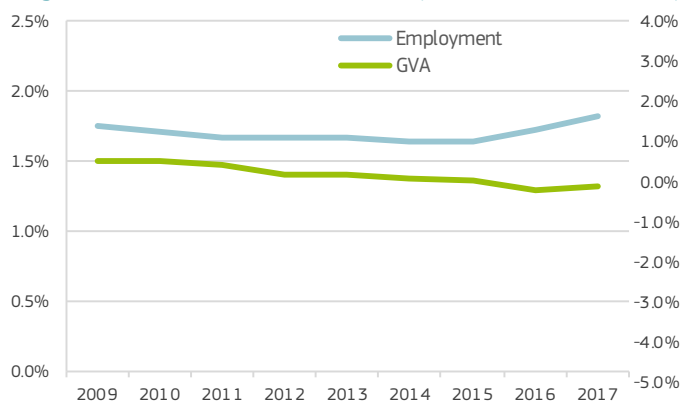
A series of factors are at play behind these trends, particularly the general macroeconomic situation and how some established blue sectors were severely hit by the global financial and economic crisis. Between 2008 and 2013, the economy as a whole was strongly affected by the global financial and economic crisis, with GDP falling more than 5% in 2009, followed by a much smaller contraction in 2012. Since then, the EU economy has progressively improved, with annual growth rates around 2% from 2014 to 2018 and forecasted to continue above 1.5% up to 2020 (Figure 5). Although data for the EU Blue Economy established sectors are only available until 2017, given the relative stability in their share over the total economy, the size of the Blue Economy (established sectors) is expected to continue to expand at a similar rate between 2018 and 2020.

Gross domestic product (GDP) is an indicator used to measure the size and performance of an economy; it provides information on the goods and services produced during a given period.

Germany had the largest economy among the EU-28 (21.3% of the total), followed by the United Kingdom (15.2%), France (14.9%) and Italy (11.2%).

At the other end of the range, Malta and Cyprus (both 0.1% of the EU total) had the smallest economies in 2017.

Figure 4 Contribution of the Blue Economy to the overall EU economy



Data for 2017 are provisional.
Source: Eurostat (SBS), DCF and own calculations.

Figure 5 GDP growth, real terms



Data for 2019-2020 are forecasts.
Source: European Commission.

14. Throughout this report, we use GDP at factors cost, which is equivalent to GVA. For further details, see the glossary.

Comparative across established sectors

Among the Blue Economy sectors Shipbuilding, Maritime transport, Extraction of non-living resources and Port activities were more affected by the global financial and economic crisis. Global **shipbuilding** orders dropped to a 30-year low in 2016. In the EU, this was particularly strong for pleasure boats and their supply chain. EU orders have recently increased compared to 2015, mainly thanks to passenger, cruise ships and other non-cargo carrying vessels (ONCCV). Despite the recent positive trends, certain segments continue to face important difficulties, in particular offshore. This evolution is reflected in the data for employment and GVA for Shipbuilding and repair (Table 2).

As regards **maritime transport**, while the sector has shown some recovery since 2013, it may face an additional challenge in the near future in meeting the International Maritime Organisation (IMO) 2020 sulphur cap. The higher cost of low sulphur fuel (LSFO) or marine gas oil (MGO) could add extra pressure to an already sluggish recovery. However, the requirement to use low-sulphur fuel is motivating a change to LNG in some sectors, which should lower costs and carbon emissions in the long run.

Low fuel prices and dwindling reserves of fossil fuels have put pressure on **offshore extraction of oil and gas** given its cost, the required high technology and risks are higher than for onshore extraction.

Finally, **port activities** were affected by the lack of international liquidity and investment from both private and public actors, as well as from spill over effects from the interconnected sectors mentioned above.

On the other hand, **coastal tourism** increased steadily in the last years. Displacement effects from the Arab spring of 2010–2013 benefited some EU Member States with many tourists changing their holiday destinations from Northern Africa and the Middle East to Southern European countries. More recently, European destinations are increasingly being replaced by destinations in Asia and Australia and European coastal mass tourism is likely to stabilise or even decline in the future.

On the positive side, the added value of the **extraction of marine living resources sector** has been expanding since 2013. This is certainly true for the capture fisheries sector, where exploitation of stocks is being brought into line with maximum sustainable yield (MSY) and is providing higher catches, of better value, and at lower cost. This

Table 2 Overview of the EU Blue Economy by sector

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	1,954	1,883	1,850	1,790	1,817	1,741	1,728	1,916	2,175
Marine living resources	591	590	571	577	560	561	560	573	571
Marine non-living resources	175	177	175	177	169	168	170	162	162
Port activities	455	451	432	463	463	495	521	574	574
Shipbuilding and repair	345	311	296	293	292	296	302	316	315
Maritime transport	239	231	229	219	219	234	239	232	232
Blue Economy	3,761	3,643	3,554	3,519	3,520	3,495	3,521	3,774	4,030
Total EU employment	215,597	212,661	212,612	211,935	211,410	213,486	215,818	218,972	221,993
Blue economy (% of EU jobs)	1.7%	1.7%	1.7%	1.7%	1.7%	1.6%	1.6%	1.7%	1.8%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	51,631	51,812	52,144	50,424	52,416	52,505	54,407	58,359	65,116
Marine living resources	16,631	16,828	17,413	17,629	17,192	18,185	19,218	20,846	20,681
Marine non-living resources	34,719	36,507	37,214	37,302	35,678	32,705	30,901	22,757	22,757
Ports and water projects	28,245	28,290	31,707	29,149	29,697	31,152	34,452	34,440	34,440
Shipbuilding and repair	12,816	13,901	13,640	13,626	13,252	14,464	14,311.1	14,916	14,821
Maritime transport	22,548	25,008	21,238	21,907	23,256	23,423	27,597	21,944	21,944
Blue Economy	166,590	172,345	173,356	170,038	171,491	172,435	180,886	173,261	179,758
EU GVA (EUR billion)	11,116	11,525	11,835	12,076	12,178	12,600	13,274	13,380	13,751
Blue economy (% of GVA)	1.5%	1.5%	1.5%	1.4%	1.4%	1.4%	1.4%	1.3%	1.3%

Note: Data for 2017 are provisional or estimates and should be interpreted with caution.
Source: Eurostat (SBS), DCF and own calculations.

improved performance of the fisheries sector is due to increased efforts under the EU Common Fisheries Policy (CFP) to fish at sustainable levels. Moreover, the sector has benefited from lower fuel prices and higher average first sale prices. Available data shows a positive link between sustainable fishing and positive economic performance, in particular in fishing regions in the North Sea and North-East Atlantic, where an increasing number of commercially important fish stocks are being fished at sustainable levels¹⁵. However, these benefits have not yet been achieved in the Mediterranean basin where most fisheries have not yet moved towards maximum sustainable yield conditions. Although the EU fleet has become more efficient, one side effect of restructuring it could be a reduction in ancillary activities.

The actual **Blue Economy goes well beyond the established sectors**. In recent years, new innovative and emerging sectors, such as wind energy and biotechnology, have grown exponentially. However, these sectors are also encountering challenges. For instance, some land-based emerging sectors are developing faster than their maritime counterparts. Wind energy production continues to be cheaper on land, making competition tough for developing offshore activities, particularly in view of low energy prices. The lack of electrical connections (cables/grids) is also a substantial barrier to the development of offshore wind farms, adding to investment costs.

Although only the **direct contribution** of the Blue Economy sectors is considered here, all sectors have indirect and induced effects on the rest of the economy, as the Meyer Werft case study contained later on in this report attempts to show. For

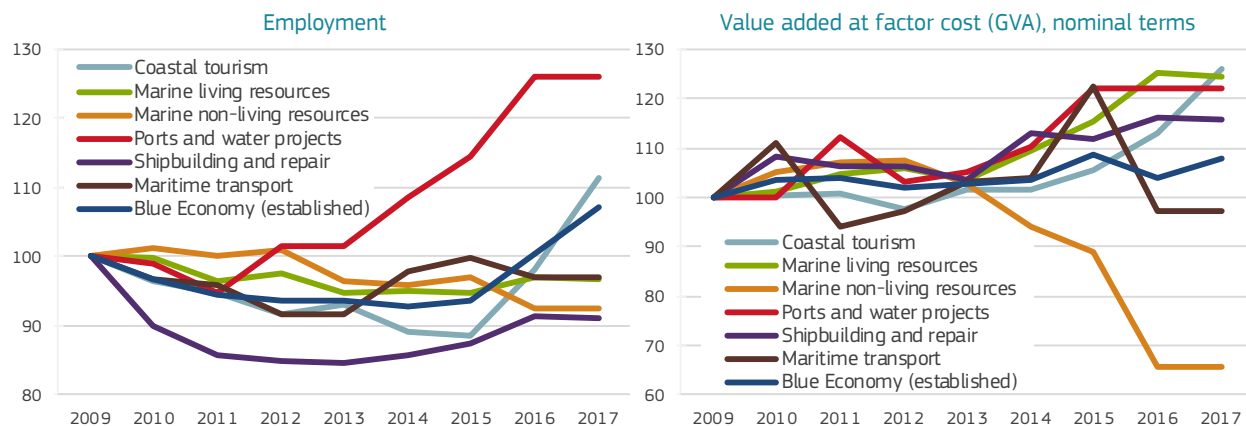
example, in shipbuilding, most of the value added is from upstream and downstream activities. This means that, beyond its specific contribution, it has important multiplier effects on income and jobs in many sectors of the Blue Economy.

Climate change and the degradation of ecosystem conditions may increasingly impact maritime activities in the future. Increasingly unpredictable and extreme weather conditions may force certain activities to alter or adapt to sudden changes. For example, the opening up of the Arctic route may alter sea traffic patterns in some areas.

The evolution of employment and gross value added generated by the different sectors is shown in Table 2 and Figure 6. The GVA generated by Coastal tourism in 2017, the largest Blue Economy sector in the EU, increased by 26.1% compared to 2009. Ports, warehousing and water projects, the second largest sector, increased by 21.9%. Other sectors that contributed to growth were Marine living resources (+24.4%), Shipbuilding and repair (+15.6%). On the contrary, Marine non-living resources dropped by 34.5% and Marine transport by 2.7%.

In terms of employment, the impact of the crisis saw a recovery post 2013; with respect to 2009, the highest relative expansion was observed, in Port activities, Marine living resources and Coastal tourism. In Shipbuilding and repair as well as Maritime transport, employment has expanded with respect to the minimum observed in 2013–2014, but it has not yet recovered to 2009 levels. In Marine non-living resources, a declining trend is seen. In terms of GVA, data show an acceleration in the growth of all sectors from 2013 onwards except for the extraction of non-living resources.

Figure 6 Evolution of the EU Blue Economy by sector, Index: 2019 = 100



Source: Eurostat (SBS), DCF and own calculations.

15. Fished at or below the maximum sustainable yield (MSY) exploitation rate (F_{MSY}).

The sectors are also very different in their capital intensity. This is the case for instance, for Coastal tourism compared to the Marine extraction of oil and natural gas. Coastal tourism is labour-intensive, and often run by small or medium-sized local or family businesses; it is widespread along the entire EU coastline. This is reflected in the sector making the greatest contribution to the EU Blue Economy in terms of employment, gross value added and profit (Figure 7), with its share increasing over time. However, the sector's contribution to GVA and profits are substantially lower than to employment.

The offshore oil and gas industry is a highly capitalised sector that requires few employees per unit of output and is concentrated in a few geographical areas. The industry is generally comprised of large, multinational companies, which might have fewer direct links to local coastal communities. Consequently, this sector accounts for only a tiny fraction of employment but one fifth of overall Blue Economy-related profits. This share, however, has fallen over time.

Significance of the Blue Economy established sectors across Member States

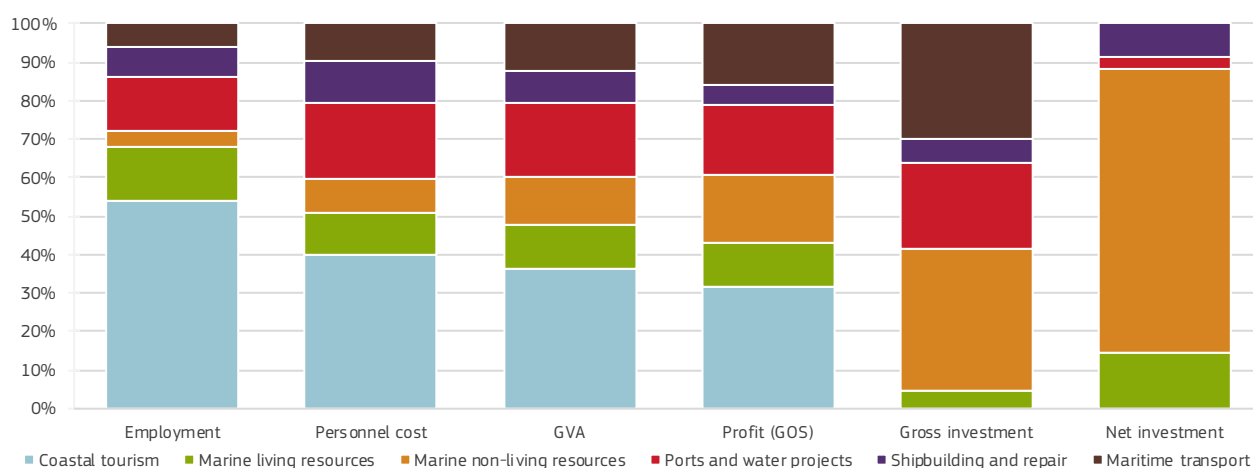
The contribution of the established Blue Economy sectors to the overall EU economy was 1.8% in terms of employment and 1.3% in terms of GVA. The contribution varies widely across Member States (Figure 8). The Blue Economy exceeded 5% of national GVA or employment in the

insular Member States and the Member States with numerous archipelagos: Greece, Croatia, Malta and Cyprus. Other Member States with relatively large Blue Economy sectors (contribution between 3% and 5% of the national total for GVA or employment) include Estonia, Spain, Portugal and Denmark. For self-evident reasons, the Blue Economy's contribution to the national economy is very limited (below 0.5%) in landlocked Member States (Luxembourg, Austria, Czechia, Slovakia and Hungary). Other Member States with a relatively modest Blue Economy (between 0.5% and 1.0% of the national economy) include Belgium, Slovenia and Romania. Three of the five largest EU economies (UK, France and Germany) are below the EU average, Italy is at the average and only Spain is above average.

In absolute terms, the five largest Member States (the UK, Spain, Germany, France and Italy) are the largest contributors to the EU Blue Economy for both employment (with a combined contribution of 61%) and GVA (a combined contribution of 70%). Other countries with significant contributions in terms of either employment or GVA include Greece, the Netherlands and Denmark (Figure 9).

The relative importance of Member States is different for each economic indicator, depending on their sectoral specialisation. For instance, the UK has a significantly larger contribution in terms of gross investment (€12.4 billion or 37% of the EU) than in terms of employment (516,000 employees or 13% of the EU) given the significance of the oil and gas industry. Similarly, with €2.2 billion of gross investment (mainly in ports and connected

Figure 7 Economic performance and main indicators, comparative across sectors, 2017



Note: Gross investments are not available for coast tourism; net investments are not available for coastal tourism, maritime transport and most of the Port activities (available only for Construction of water projects).

Source: Eurostat (SBS), DCF and own calculations.

activities), Belgium contributes with almost 7% to the EU total while it only employs 28,000 people in the Blue Economy (0.7% of the EU). On the other hand, Spain, Italy and Greece are more specialised in more labour intensive sectors such as Coastal tourism or Extraction of living resources and their contribution to the EU Blue Economy is larger in terms of employment than in terms of GVA or gross investment (Figure 9).

There is an increase in GVA generated by the Blue Economy established sectors in most Member States between 2009 and 2017. The most significant expansion is observed in Ireland and Malta (with a cumulative increase of over 50%).

Similarly, an expansion of about 30% or more is observed in Belgium, Bulgaria, Estonia, Greece, Croatia, Lithuania, Latvia, Portugal and Sweden. On the other hand, GVA in Denmark and the Netherlands have not yet recovered to the levels observed in 2009, with figures still showing small declines by 2017. An expansion in employment in a number of Member States can also be observed, with 2017 figures being 30% larger than in 2009 in Greece, Portugal, and 20% in Denmark and Ireland. However, in some Member States, employment has not recovered 2009 levels yet (e.g. Finland, France, Croatia, Italy and Malta)¹⁶.

Figure 8 Size of the Blue Economy compared to the total per Member State, 2017, percentage

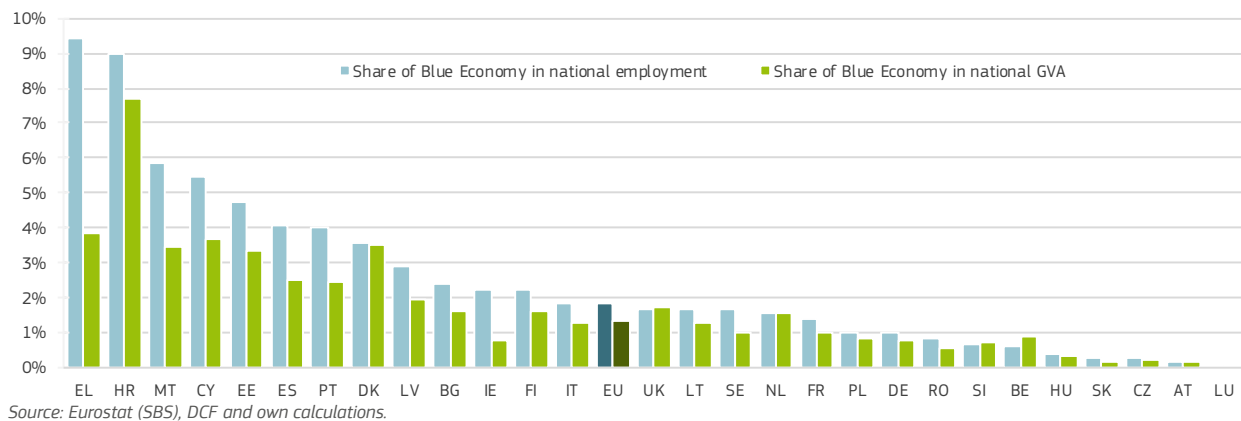
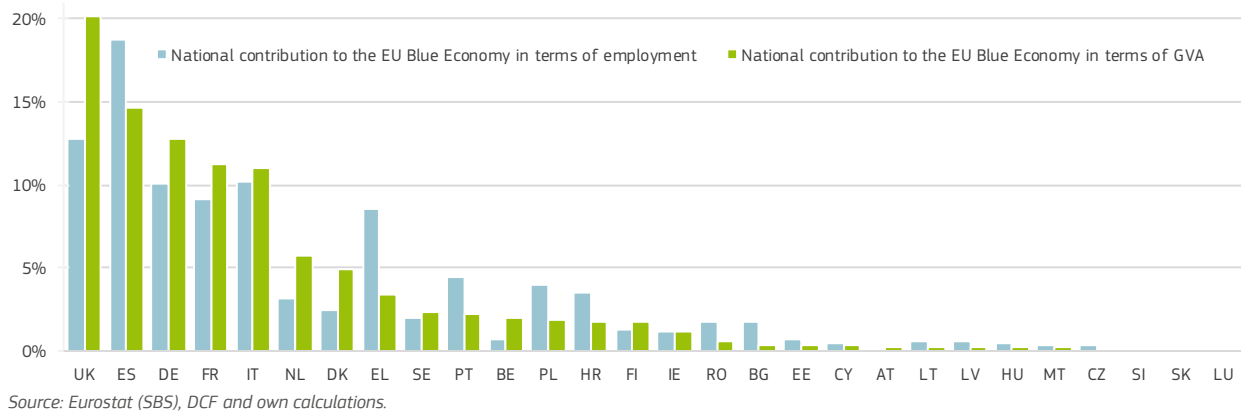
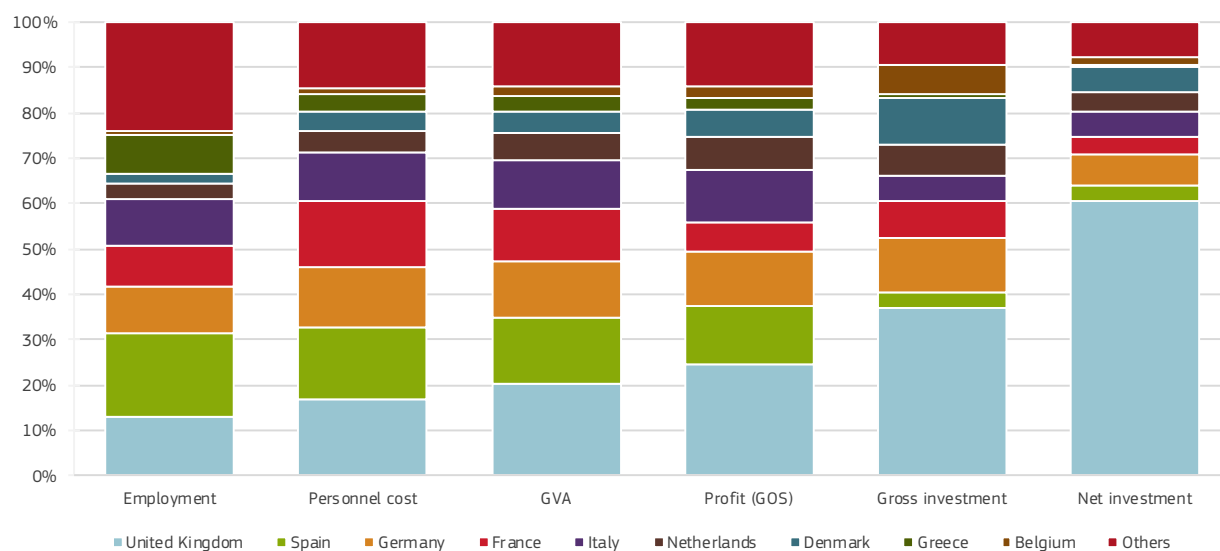


Figure 9 National contribution to the EU Blue Economy in terms of employment and GVA, 2017, percentage



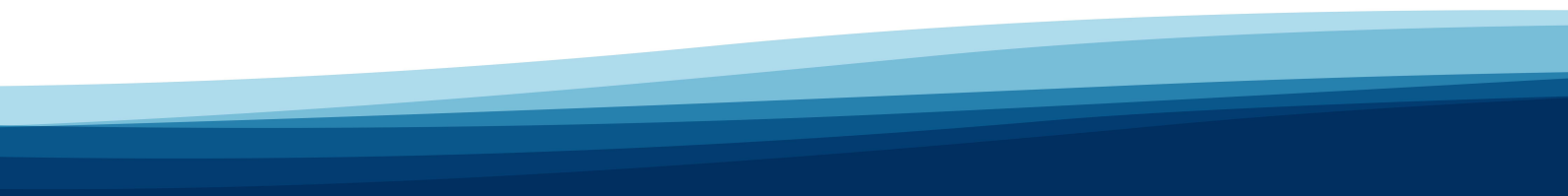
16. This analysis does not include the landlocked Member States or the Member States with small blue economies as the relative evolution may be distorted by the low figures.

Figure 10 Economic performance and main indicators, comparative across Member States, 2017



Source: Eurostat (SBS), DCF and own calculations.

CHAPTER 3:
**CURRENT STATUS
AND RECENT TRENDS:
ESTABLISHED SECTORS**



The established sectors continue to be the main pillar and contributor to the EU Blue Economy and it is also in these sectors where more comparable and accurate data are available.

This chapter offers a detailed insight into the current status for the six established Blue Economy sectors by diving into their sub-sectors and activities in different Member States. Based mostly on Eurostat and DCF data, this chapter provides a summary of the trends and drivers behind each established sector, and how the sectors interact among each other.

As indicated in Chapter 1, the six established sectors that we consider in this Report are Coastal tourism, Marine living resources, Marine non-living resources, Port activities, Shipbuilding and repair and Maritime transport. Each sector is further divided in a few sub-sectors as summarised in Table 3. The details of what is included in each sector and subsector are explained in Annex II.

Table 3 The six Established Sectors in the Blue Economy and their subsectors

Sector	Sub-sector
Coastal tourism	Accommodation Transport Other expenditures
Marine living resources Extraction and commercialisation of marine living resources	Capture fisheries Aquaculture sector Processing and distribution
Marine non-living resources Marine extraction of minerals, oil and gas	Extraction of crude petroleum Extraction of natural gas Extraction of marine aggregates Support activities for petroleum and natural gas extraction Support activities for other mining
Port activities Ports, warehousing and construction of water projects	Warehousing and storage Cargo handling Construction of water projects. Service activities incidental to water transportation
Shipbuilding and repair	Building of ships and floating structures Building of pleasure and sporting boats Marine machinery Marine equipment Repair and maintenance of ships and boats
Maritime transport	Sea and coastal passenger water transport Sea and coastal freight water transport Inland passenger water transport Inland freight water transport Renting and leasing of water transport equipment

Source: own elaboration.

3.1. COASTAL TOURISM

Coastal tourism covers beach-based tourism and recreational activities, e.g. swimming, sunbathing, and other activities for which the proximity of the sea is an advantage, such as coastal walks and wildlife watching. Maritime tourism covers water-based activities and nautical sports, such as sailing, scuba diving and cruising. For the purpose of this report, Coastal tourism also refers to maritime tourism and is broken down into three activities: accommodation, transport and other expenditures.

As it encompasses various economic activities, and the link with oceans and/or coastal regions is sometimes weak, Coastal tourism tends to outweigh the other sectors of the Blue Economy in terms of turnover, value added and employment.

Coastal and maritime tourism has been identified as one sector with a high potential for sustainable jobs and growth in the Blue Growth Strategy. Actions taken by the European Commission have focused on Community-Led Local Development strategies (CLLD) supported by the European Maritime and Fisheries Fund (EMFF) as well as direct funding for underwater cultural heritage projects. Beyond the EMFF, nautical tourism has received ample support from the European Regional Development Fund (ERDF).

Overall, Coastal tourism accounted for 54% of the jobs, 36% of the GVA and 32% of the profits in the total EU Blue Economy in 2017. The sector has grown substantially over the analysed period.

COASTAL TOURISM

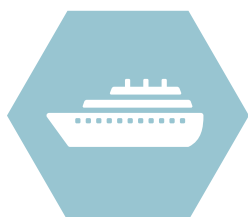
Contribution to the EU blue economy: 54% of jobs / 36% GVA / 32% profits

The sector employed almost 2.2 million persons and generated EUR 65 billion in value added and EUR 23.5 billion in profits



ACCOMMODATION

- Status: Mature and increasing: ↗ jobs ↗ profits
- **GVA:** EUR 32.6 billion (+28%)
- **Jobs:** 990 452 persons (+7%)
- Actions: Reduce environmental impact, mitigate/adapt to climate change threats, create synergies with other blue sectors



TRANSPORT

- Status: Mature and stagnated to increasing: ↘ jobs ↗ profits
- **GVA:** EUR 14 billion (+21%)
- **Jobs:** 234 892 persons employed (-9%)
- Actions: Reduce environmental impact (water quality, CO2 emissions) and increase local benefit from cruise tourism



OTHER EXPENDITURE

- Status: Mature and stable to increasing ↗ jobs ↗ profits
- **GVA:** EUR 18.4 billion (+27%)
- **Jobs:** 949 383 persons employed (+28%)
- Actions: quality versus quantity (high quality local products, personalised instead of mass tourism)

Tourism in the EU: an overview

According to a recent study of the European Commission¹⁷, the EU welcomed 500 million international tourist arrivals (overnight visitors) in 2017, accounting for 40% of the world's total. International tourism receipts reached €342 billion, representing 31% of worldwide tourism earnings.

EU destinations counted 608,000 accommodation establishments in 2017 with a total capacity of 31 million beds, 44% of which were in hotels. Around 1 billion guests spent 3.1 billion nights in EU accommodation establishments.

EU destinations received 139 million arrivals from outside the Union, of which 56 million from European countries outside the EU. They received 83 million arrivals from outside Europe, of which 39 million from the Americas, 33 million from Asia and the Pacific, 6 million from Africa and 5 million from the Middle East. Guests from Extra-EU countries spent 137 million nights in EU accommodation establishments in 2016, and interregional EU guests, 276 million nights. The United States is the top source of tourists outside the EU with 74 million nights, followed by Switzerland (44 million nights), the Russian Federation (32 million nights) and China (25 million nights).

Within the EU, southern and Mediterranean Europe is the most visited with 193 million arrivals in 2017, followed by western Europe (171 million), northern Europe (66 million) and central and eastern Europe (70 million). Five out of the top ten destinations in the world are located in the European Union: France, Spain, Italy, Germany and the United Kingdom. A large part of this tourism takes place in coastal areas. The most popular tourist region in the EU-28 was the Canary Islands, followed by another Spanish region, Catalonia, and

the coastal region of Adriatic Croatia. The list of top regions is completed with Balearic Islands (ES), Andalusia (ES), Veneto (IT), Provence-Alpes-Côte d'Azur (FR) and Valencia (ES).

Europe is also the world's largest source region for outbound tourism, generating an estimated 618 million arrivals, half of the world's total, to destinations worldwide in 2017. Four out of the top ten global source countries are located in the European Union: Germany, the United Kingdom, France and Italy. In total, EU residents made 1.2 billion trips and spent 6 billion nights, mainly within their own country (58% of trips and 74% of nights).

Size of the EU Coastal tourism in 2017

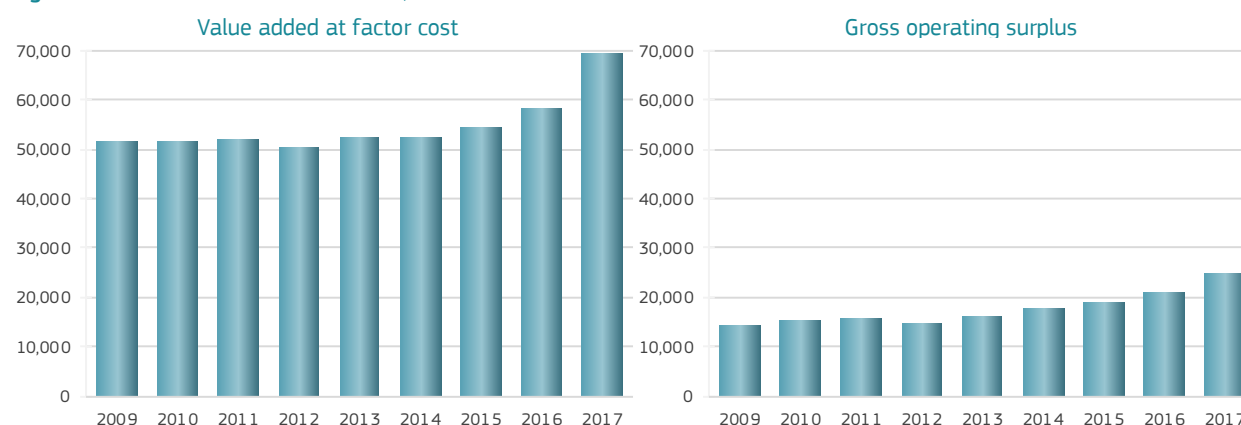
GVA generated by the sector amounted to just over €65.1 billion, a 12% rise compared to 2016¹⁸. Gross operating surplus was valued at €23.5 billion (+11.5% compared to 2016 and 64% compared to 2009) (Figure 11) and labour productivity was €43,500 per FTE in 2017, up from €37,900 in 2009. Turnover amounted to €184.2 billion, 23% more than in 2009.

Around 2.2 million people were directly employed in the sector (up by 13.5% compared to 2016). Personnel costs reached €41.7 billion, up from €37.2 billion in 2009 (Figure 12), amounting to an average wage of €19,800 in 2017, a slight increase from €19,100 in 2009. The sector was impacted by the global economic and financial crisis, which saw a gradual decrease in employment over the period 2009 to 2015. However, in the last two years a strong recovery can be seen. Personnel costs have followed a similar trend; hence, average wages have remained relatively stable during the period.

17. European Commission. 2018. European Union Tourism Trends (<https://ec.europa.eu/growth/tools-databases/vto/content/2018-eu-tourism-trends-report>).

18. In 2017, a few countries (e.g. Denmark and Sweden) change the methodology for the collection of tourism statistics and therefore, there is a break in the series. Growth rates have been estimated by adjusting for the change of methodology.

Figure 11 Size of the EU Coastal tourism, € million



Source: Eurostat (SBS) and own calculations.

Sub-sectors and Member States

Employment: Accommodation generated almost 1 million jobs, 45% of the Coastal tourism direct employment, followed by other expenditures with 949,383 persons employed and then transport with 234,892 jobs in 2017 (Figure 13). Compared to 2009, all sub-sectors, apart from transport, saw an increase in persons employed: +3.6% accommodation, +28% other expenditure and -8.7% transport.

Turnover: Accommodation generated €67.2 billion in turnover, followed by other expenditure (€64.7 billion) and then transport (€52.3 billion) in 2017. Compared to 2009, all sub-sectors saw turnover increase: +25.7% accommodation, +26.1% other expenditure and +15.4% transport.

Gross value added: Most of the value added is also generated by accommodation: €32.6 million (50% of the total), followed by other expenditure €18.4 million and transport €14.1 million (Figure 13). Compared to 2009, all sub-sectors saw substantial increases in GVA: +28% accommodation, +27% other expenditure and +21% transport.

Gross profit: The bulk of profits are generated by accommodation (€13.5 billion, 57.5%), followed by other expenditure (23%) and transport (19%). Compared to 2009, gross operating surplus increased for all sub-sectors in all: by 72.4% in accommodation, 18% in other expenditure and 146% in Transport.

Figure 13 EU Coastal tourism by subsector, 2017

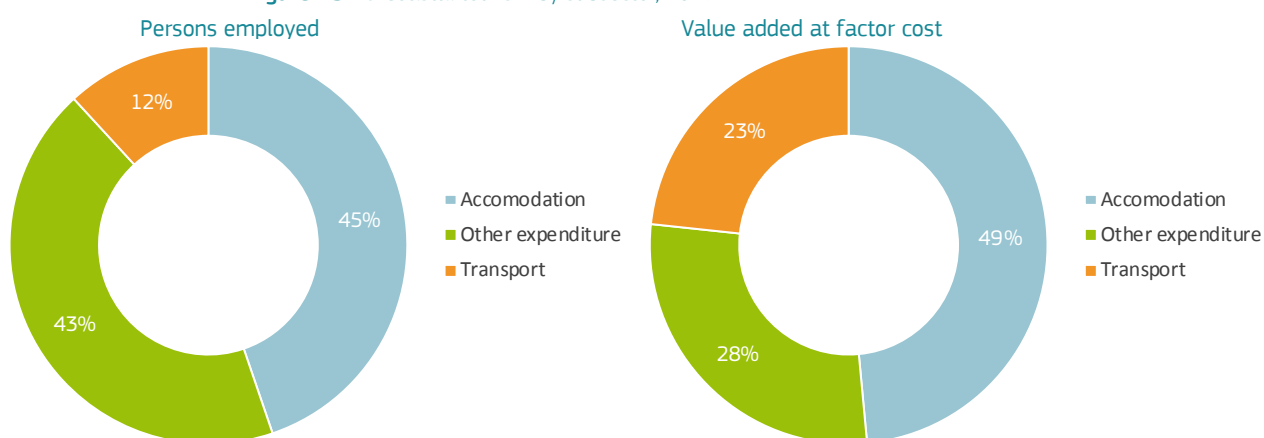
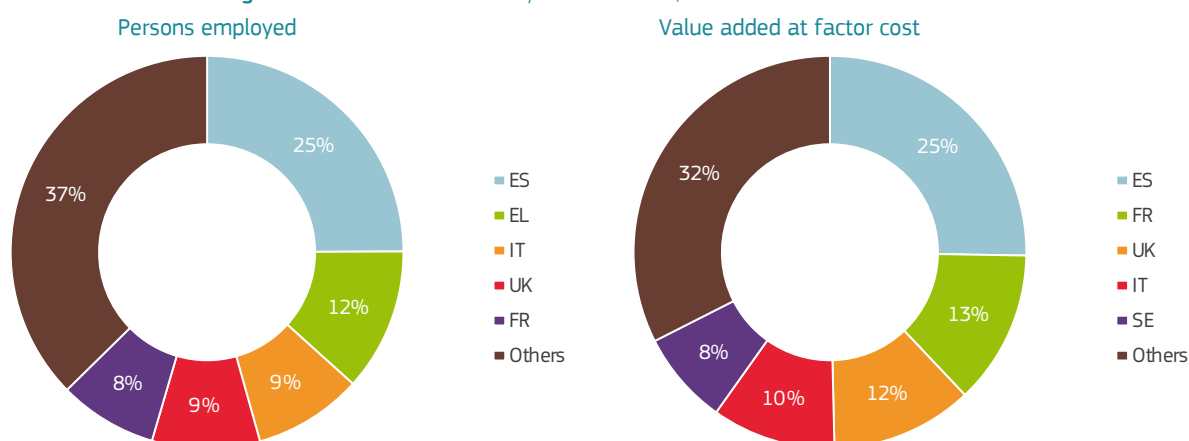


Figure 14 EU Coastal tourism by Member State, 2017



Trends and drivers

Coastal communities, mainly composed of SMEs and micro enterprises, are also particularly vulnerable to economic, financial and political changes. Regional and structural EU and EU instruments can help to finance project planning and implementation for the sector to take up the challenges and invest in modernisation and innovation.

Spain clearly dominates the Coastal tourism sector, accounting for 25% of the overall jobs and GVA in the total EU Blue Economy in 2017.

Interaction with other Blue Economy sectors

Coastal and maritime tourism depend highly on good environmental conditions and in particular on good water quality. Any maritime or land-based activity deteriorating the environmental can negatively affect tourism. Coastal areas may also be directly or indirectly affected by a number of climate change related impacts, such as, flooding, erosion, saltwater intrusion, increase in air and seawater temperatures and droughts.

Ports are crucial for the economic growth of coastal and inland areas. Passenger and cruise transport are important means for maritime and coastal tourism development while freight transport can be seen as a competing activity in terms of space. An example of this weak balance appears in cruise tourism. The EU Commission promotes a pan-European dialogue between cruise operators, ports and coastal tourism stakeholders to enhance synergies in the sector, targeting best practice sharing in innovation, competitiveness and sustainability strategies.

Synergies may emerge through alternative activities, including eco-tourism and marine protected areas (as illustrated in an MPA case study contained in this report). Co-existence with other Blue Economy sectors, such as extraction of living and non-living marine resources may depend on direct spatial conflicts, while synergies may also exist. For example, renewable energies such as offshore wind farms may help to mitigate environmental impacts by reducing carbon and other greenhouse gas emissions but may imply a trade-off with aesthetic benefits.

3.2. EXTRACTION AND COMMERCIALISATION OF MARINE LIVING RESOURCES

The extraction and commercialisation of marine living resources encompasses the harvesting of renewable biological resources (primary sector), their conversion into food, feed, bio-based products and bioenergy and their distribution along the supply chain. For the purpose of this report, Marine living resources comprises three subsectors, further broken-down into activities; capture fisheries (small-scale coastal and large-scale industrial fleets), aquaculture (marine finfish, shellfish and freshwater) and processing and distribution (processing and preservation of fish, crustaceans and molluscs, retail sale, wholesale, prepared meals, oils and fats, and other food products).

Capture fisheries production has increased and may have the capacity to do so further, particularly in the Mediterranean Sea. Profits have risen over

the last few years, in part due to better status of fish stocks, increased average market prices and reduced operating costs, in particular fuel costs, which is one of the main constraints for the fishing fleet.

EU **aquaculture** production has been stagnant in the last decades, not participating in the global increase of aquaculture production. In the EU, wild-capture fisheries is still the main source of human-food production from the oceans. However, the turnover and economic performance of the EU aquaculture sector have increased over time. Aquaculture has been identified as a sector with a high potential for sustainable jobs and growth in the Blue Growth Strategy.

The **processing and distribution** activities are heavily dependent on the supply of raw materials

MARINE LIVING RESOURCES

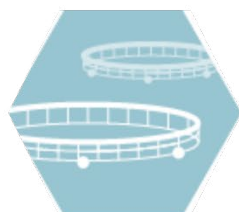
Contribution to the EU blue economy: 14% of jobs / 12% GVA / 12% profits

The sector employed 571 478 persons (-3%) and generated EUR 20.7 billion in value added (+24%) and EUR 8.6 billion in profits (+45%).



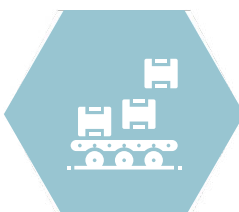
CAPTURE FISHERIES

- Status: Mature and stable (production): ↘ jobs ↗ profits
- **GVA:** EUR 4.6 billion (+35%)
- **Jobs:** 151 163 persons (-11%)
- Actions: Reduce fishing capacity and improve status of stocks



AQUACULTURE

- Status: Mature and stagnated (production): ↘ jobs ↗ profits
- **GVA:** EUR 2 billion (+59%)
- **Jobs:** 72 801 persons (-3%)
- Actions: Increase access to space and deregulation



PROCESSING AND DISTRIBUTION

- Status: Mature and stable to increasing ↔ jobs ↗ profits
- **GVA:** EUR 14 billion (+18%)
- **Jobs:** 347 513 persons employed (+0.5%)
- Actions: Guarantee adequate supply of quality raw materials

from the primary sector. Increased demand for seafood products and stagnation in the primary sector make processing and distribution activities increasingly dependent on imports from third countries (see sub-sector profiles for more details).

The EU is the largest importer of seafood in the world. Its self-sufficiency in meeting a growing demand for fish and aquaculture products from its own waters is 45%¹⁹. In broader terms, these activities form an integral part of the EU's "Blue bio economy", which includes any economic activity associated with the use of renewable aquatic biological biomass, e.g. food additives, animal feeds, pharmaceuticals, cosmetics, energy, etc. Unlocking the high potential of the "Blue bio economy" is a key element to support local bio economy development according to the 2018 update of the Bio economy Strategy.

The following analysis of this sector includes:

- Primary production:
 - **Capture fisheries:** small-scale coastal and industrial fleets.
 - **Aquaculture:** finfish marine, shellfish and freshwater aquaculture.
- Processing and distribution:
 - **Processing:** Processing and preservation of fish, crustaceans and molluscs, manufacture of oils and fats, prepared meals and dishes and other food products.
 - **Distribution:** Retail sale of fish, crustaceans and molluscs in specialised stores and wholesale of other food, including fish, crustaceans and molluscs.

Due to limited data availability, the current analysis excludes the biotechnology and bioenergy industries, which are included in the emerging sectors.

Overall, the sector accounted for 14% of the jobs, 12% of the GVA and 11% of the profits in the total EU Blue Economy in 2017.

Size of the EU living resources sector in 2017

The value added (GVA) generated by the living resource sector amounted to €20.7 billion, a 24% increase compared to 2009 and gross profit, valued at €8.6 billion, saw a 44.7% rise on 2009 (€5.9 billion) (Figure 15). Total turnover amounted to €128.9 billion, 28% more than in 2009. Labour productivity went from €39,000 per FTE in 2009 to €49,700 per FTE in 2017. The sector invested €2.2 billion in tangible goods, a figure that has remained relatively constant over the period of analysis.

The sector directly employed 571,478 persons. With annual personnel costs valued at €11.4 billion, average annual wage amounted to €20,100, up from €16,880 in 2009 (Figure 16).

Sub-sectors and Member States

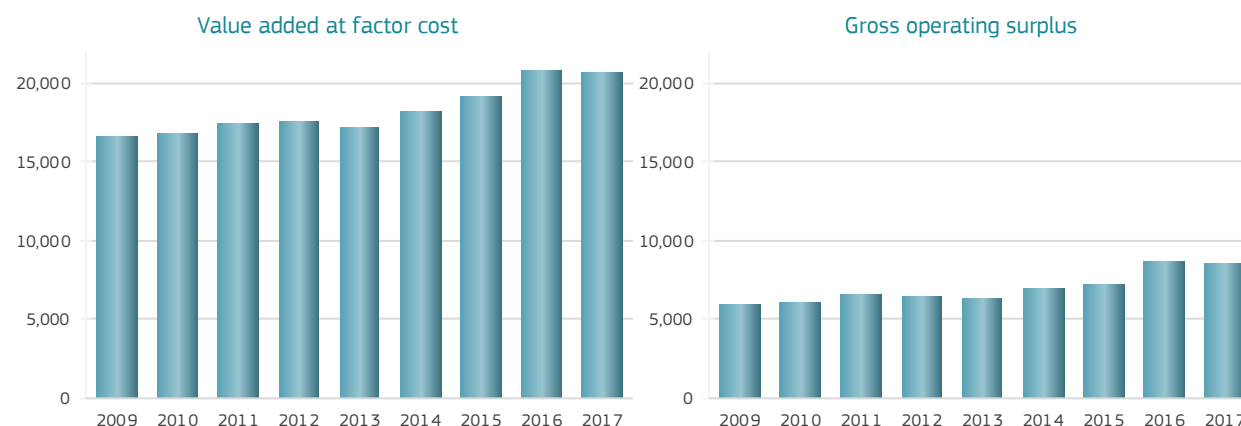
Employment: Processing and distribution activities contributed to 61% of the jobs in 2017, followed by capture fisheries (26%) and then aquaculture (13%) (Figure 17). Employment decreased by 3.3% since 2009. Only Processing and distribution saw a slight increase (0.5%). The top employers, in descending order, include Spain, Italy, France, the UK and Germany (Figure 18).

Turnover: Processing and distribution led to a turnover of €115.7 billion, a 29.8% rise compared to 2009. Capture fisheries produced a turnover of €7.9 billion, 10.7% more than in 2009. Aquaculture, at €5.2 billion, saw a 28.2% increase compared to 2009.

Gross value added: Most of the value added is generated by Processing and distribution activities, together accounting for 68% of GVA, followed by capture fisheries (22%) and then aquaculture (10%) (Figure 17). Processing

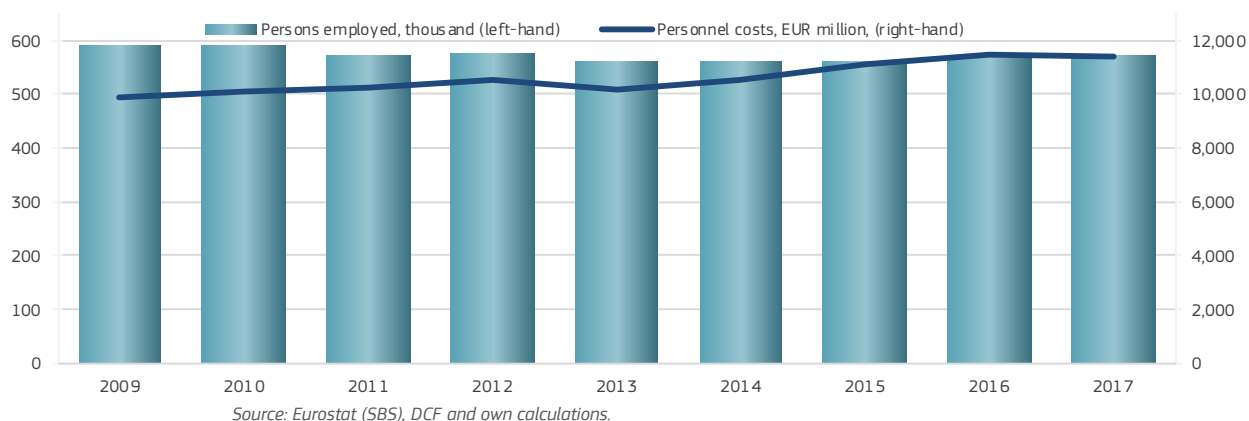
19. European Commission (2018). A sustainable Bio economy for Europe: strengthening the connection between economy, society and the environment. Updated Bio economy Strategy. Luxembourg: Publications Office of the European Union. KI-04-18-806-EN-C ISBN 978-92-79-94145-0; doi: 10.2777/47838.

Figure 15 Size of the EU extraction and commercialization of Marine living resources sector, € million



Source: Eurostat (SBS), DCF and own calculations.

Figure 16 Persons employed and personnel costs in the EU extraction and commercialization of marine living resources



and distribution generated €14 billion in GVA, increasing 17.7% compared to 2009. Capture fisheries produced €4.6 billion in GVA, a 35% rise on 2009. Aquaculture, at almost €2 billion in GVA, saw the biggest increase (+58.5% compared to 2009). The top contributors, in descending order, include Spain, Italy, France, the UK and Germany (Figure 18).

Gross profit: At almost €8.6 billion in 2017, gross profit increased by 44.7% compared to 2009. Processing and distribution generated €5.5 billion in profits and contributed to 64% of the sector's total in 2017, this implies a 10.6% increase compared to 2009. Capture fisheries, contributed with 25% (€2.1 billion) and saw a significant increase of 166% compared to 2009. Aquaculture contributed the remaining 11% (€954 million) and also saw a huge increase (+565%) on 2009 figures.

Net investment in tangible goods: Contrary to profit, net investment saw cuts in all sub-sectors compared to 2009, some more significant than others: -2% in capture fisheries, -33.6% in aquaculture and -13.5% in processing and distribution.

Spain leads the Marine living resources sector with 20% of the jobs and 17% of the GVA. Moreover, Spain generates the most jobs in all five sub-sectors apart from wholesale, where Germany takes the lead.

3.2.1. CAPTURE FISHERIES

The 2018 Annual Economic Report on the EU fishing fleet²⁰ provides an overview of the structure and economic performance of the 23 coastal EU Member State fishing fleets.

The EU fishing fleet numbered around 83,300 vessels with a combined gross tonnage of 1.56 million tonnes and engine power of 6.3 million kilowatts. Almost 80% of the total EU fishing vessels were active in 2017. Direct employment stood at 151,163 fishers, corresponding to 113,565 full time equivalents (FTEs). The average annual wage per FTE was estimated at €26,400, ranging from €1 800 in Cyprus to €131,000 in Belgium. The EU fleet landed almost 5 million tonnes of seafood with a reported landed value of €7.7 billion.

GVA and gross profit (all excluding subsidies) generated by the EU fleet were €4.6 billion and €1.6 billion, respectively. GVA as a proportion of revenue was estimated at 54% and the gross profit margin at 23%. With a total net profit of €798 million, 11% of the revenue generated by the EU fleet in 2017 was retained as net profit.

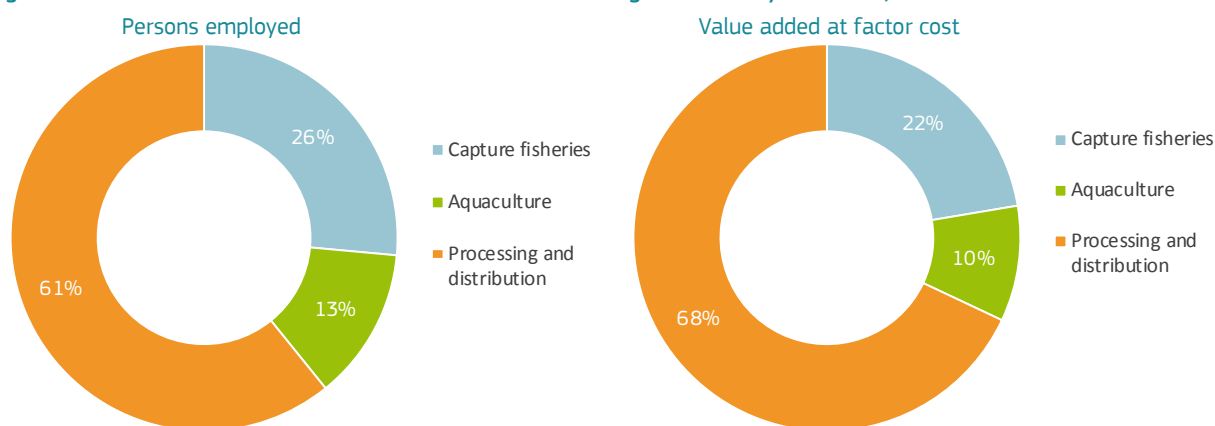
The small-scale coastal fleet employs over half of fishers while the industrial fleet generated more than 84% of the GVA (Figure 19). Performance of the large-scale industrial fleet has generally improved over the period analysed while that of the small-scale coastal fleet has stagnated (Figure 20).

Trends and drivers

Improvements in the sector are largely attributed to the recovery of some important fish stocks and increased fishing opportunities, in particular in the

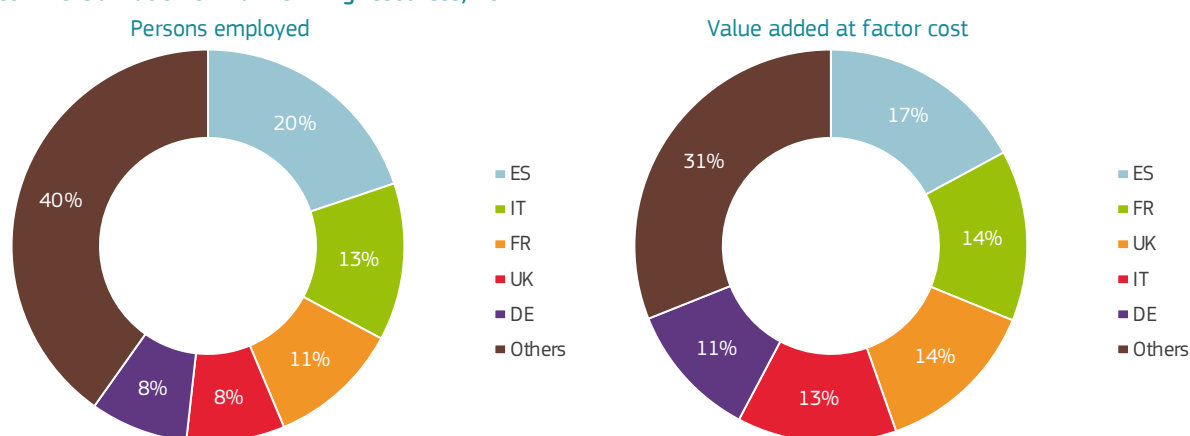
20. Scientific, Technical and Economic Committee for Fisheries (STECF) – The 2018 Annual Economic Report on the EU Fishing Fleet (STECF-18-07). Publications Office of the European Union, Luxembourg, 2018, JRC112940, ISBN 978-92-79-79390-5, doi:10.2760/56158.

Figure 17 EU extraction and commercialisation of Marine living resources by subsector, 2017



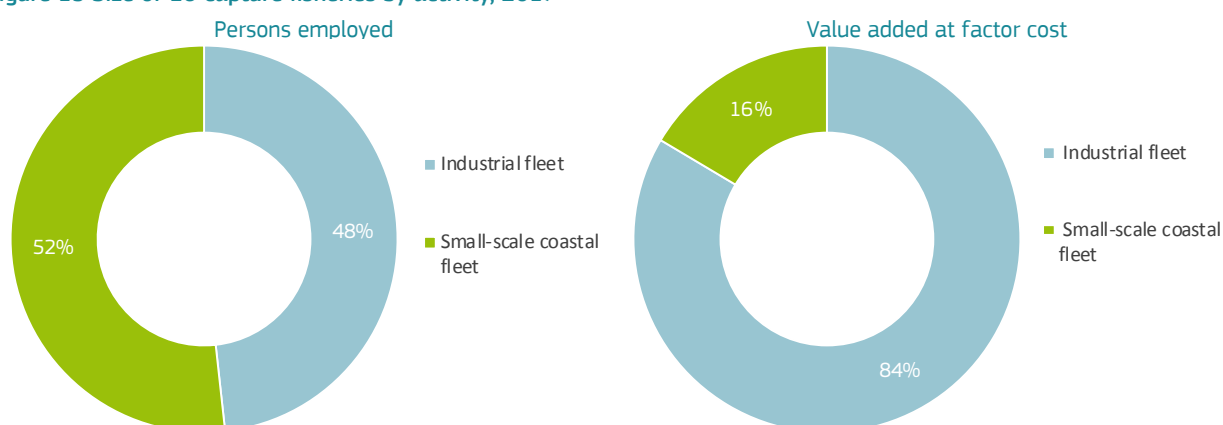
Source: Eurostat (SBS), DCF and own calculations.

Figure 18 Share of employment and gross value added by Member States in extraction and commercialization of Marine living resources, 2017



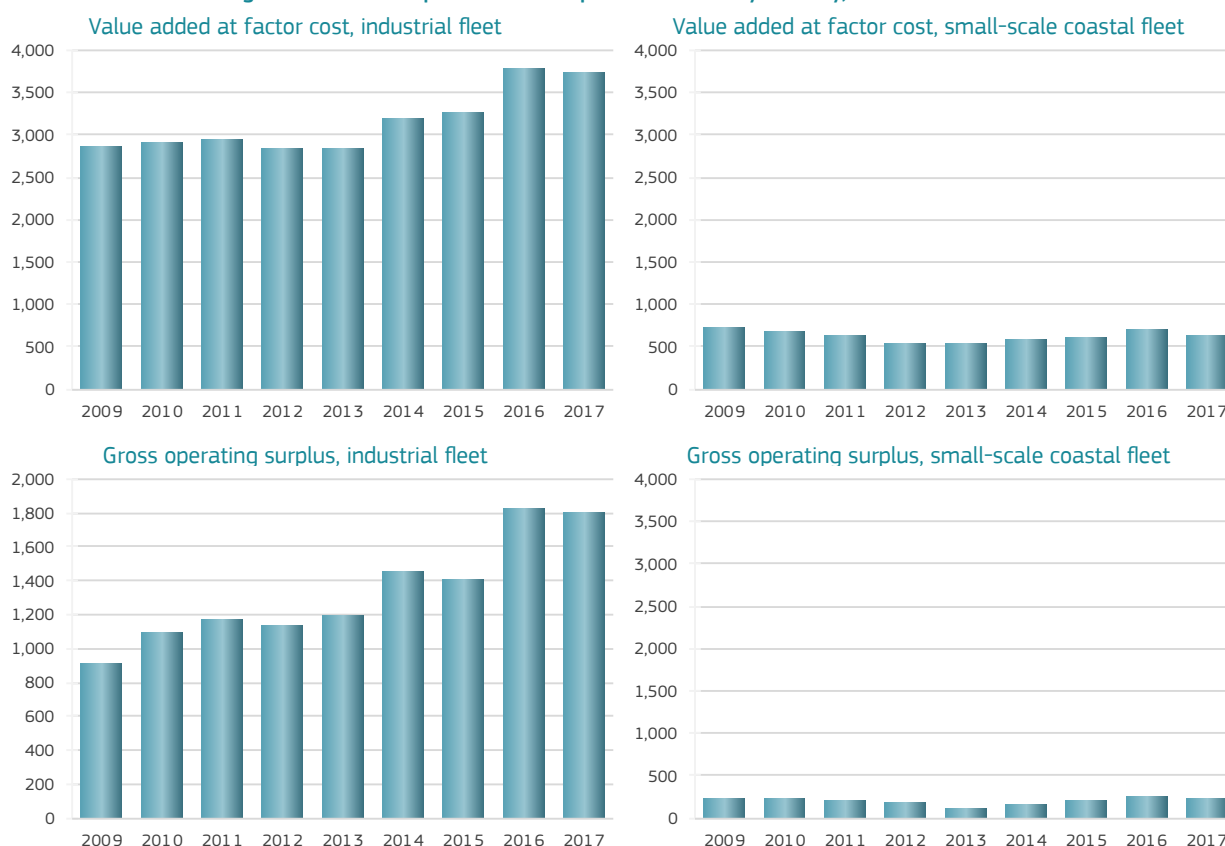
Source: Eurostat (SBS), DCF and own calculations.

Figure 19 Size of EU capture fisheries by activity, 2017



Source: DCF and own calculations.

Figure 20 GVA and profits in EU capture fisheries by activity, € million



Source: DCF and own calculations.

North-East Atlantic and nearby waters, together with increased average first sale prices of some commercially important species and lower operating costs (in particular fuel costs).

The economic performance of the capture fisheries sector is expected to continue to improve as fish stocks recover and capacity continues to adapt. Economic performance has also benefited from decreasing fuel prices, but this could reverse in the future. The landing obligation should lead to more abundant fish stocks with larger fish sizes in the long term, which would be translated into an increase in the revenues and a reduction in the operational costs, leading to further improvements in the economic performance.

Interaction with other sectors

Commercial fishing competes with other maritime activities in terms of access to resources and space. This is particularly the case with respect to Coastal tourism, recreational fishing, shipping, offshore oil and gas, marine mining (aggregates) and offshore windfarms. On the other hand, the capture fisheries sector may benefit from positive spill over effects generated by the MPAs where fisheries resources are protected effectively.

3.2.2. AQUACULTURE

The 2018 Economic Report on the Performance of the EU Aquaculture Sector²¹ provides an overview of the sector's structure and economic performance for 2008-2016.

The EU aquaculture sector reached 1.4 million tonnes in sales volume and €4.9 billion in sales value in 2016. EU aquaculture production is mainly concentrated in five countries: Spain, the United Kingdom, France, Italy and Greece, which together account for about three quarters of the total EU-28 production in terms of weight and value.

According to almost all economic indicators, the economic performance of the EU aquaculture sector in 2017 has been improving compared to previous years. This development is observed for all the three sub-segments: marine fishes, freshwater fishes and shellfish, which are all showing economic growth and generating profits.

- **Finfish marine:** profit €489 million. The United Kingdom is the main EU salmon producer, with Greece and Spain producing mostly seabass and seabream.
- **Shellfish:** profit €267 million. The main countries are France (mostly oysters), Spain (mussels) and Italy (clams).

21. Scientific, Technical and Economic Committee for Fisheries (STECF) – Economic Report of the EU Aquaculture sector (STECF-18-19). Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-79402-5, doi:10.2760/45076, JRC114801.

- **Freshwater:** profit €198 million. Italy, France and Denmark are the main producers of trout and, Eastern Europe, particularly Poland, is the main producer of carp.

Trends and drivers

EU aquaculture production by weight has been stagnant in the last decades, even if the production value has increased. This stagnation or decrease in the EU aquaculture production is mainly due to the decrease in the mussel production from diseases and lack of mussel seeds. While production of higher value species (e.g. salmon, seabass and seabream), which have better production control by the farmer (e.g. feeding, medicines, juveniles, brood stock, etc.) has increased by almost 40% during the period 2008–2016²².

The European Commission has identified the causes of stagnation and barriers to the development of EU aquaculture²³. The European Commission also intended to stimulate the aquaculture sector and published the Strategic Guidelines for Aquaculture²⁴ in 2013 presenting common priorities and general objectives at EU level. In consultation with relevant stakeholders, four priority areas were identified: (i) reducing administrative burdens, (ii) improving access to space and water, (iii) increasing competitiveness, and (iv) exploiting competitive advantages due to high quality, health and environmental standards. In 2014–2015, EU Member States developed Multiannual National Strategic Plans for the promotion of sustainable aquaculture, proposing concrete actions to address these strategic priorities²⁵.

In these Multiannual National Strategic Plans, the Member States quantify production growth objectives for their domestic aquaculture sector, forecasting for 2020 an overall production increase of more than 300,000 tonnes (25%) from the 2013 level. The EU has invested €1.17 billion during the period 2000–2014 through the Financial Instrument for Fisheries Guidance (FIFG) and the European Fisheries Fund (EFF) to promote the EU aquaculture sector, and plans to spend a further €1.72 billion over the period 2014–2020 through the EMFF. This support aims to improve food security and economic development in line with the EU's Blue Growth Strategy and the potential of creating sustainable growth and jobs from marine sectors.

Considering the increasing demand of seafood products in the EU, it seems realistic to expect a growth of the EU aquaculture products with a high degree of control (e.g. in close systems), while production of shellfish (e.g. mussels, oysters and clams) will be more dependent on environmental factors as they are produced in open waters. The economic performance of the EU aquaculture sector is at the same time dependent on international competition. The sector has very high production standards in terms of environmental protection, animal health and welfare, public health and safety, and working conditions.

Interaction with other sectors

Aquaculture may compete in the access to space with Coastal tourism, ports, shipping, offshore oil and gas, marine mining (aggregates) and fishing. Synergies may exist with offshore windfarms (e.g. multi-use platforms).

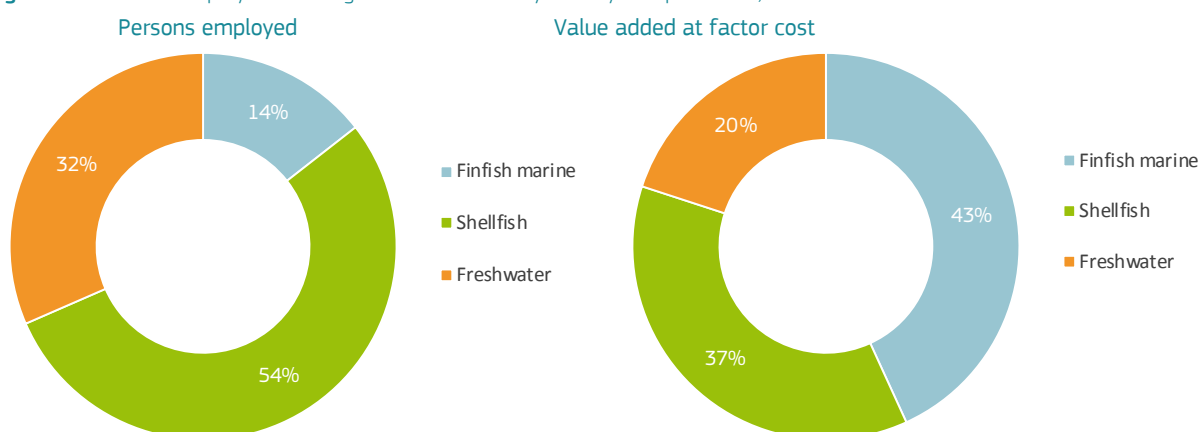
22. Guillen, J., Asche, F., Carvalho, N., Fernández Polanco, J.M., Llorente, I., Nielsen, R., Nielsen, M., Villasante, S. 2019. Aquaculture subsidies in the European Union: Evolution, impact and future potential for growth. Marine Policy.

23. European Commission (2009) Communication from the Commission to the European Parliament and the Council of 8 April 2009 - Building a sustainable future for aquaculture - A new impetus for the Strategy for the Sustainable Development of European Aquaculture, COM(2009) 162 final.

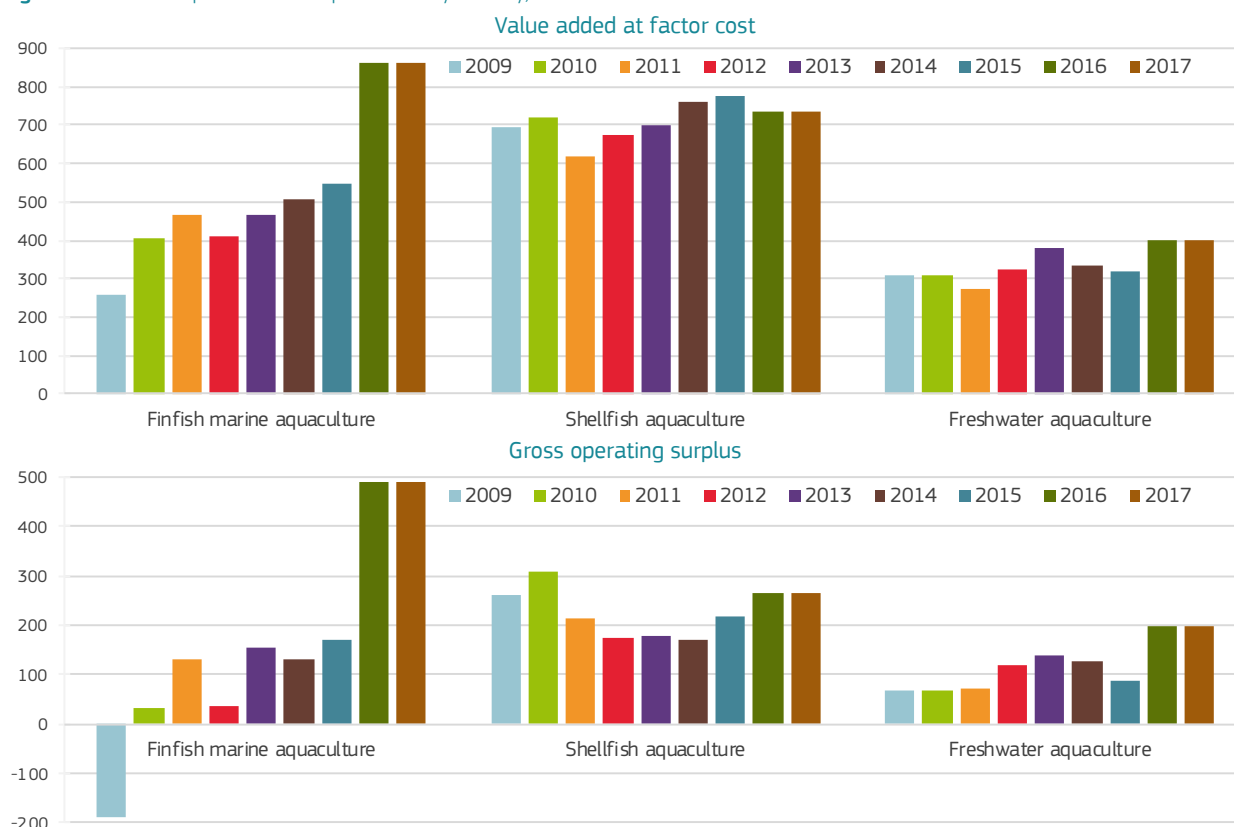
24. European Commission (2013) Communication from the Commission to the European Parliament, the Council, The European Economic and social Committee and the Committee of the Regions. Strategic Guidelines for the sustainable development of EU aquaculture. COM/2013/0229 final.

25. Detailed information for each country is available at: <https://ec.europa.eu/fisheries/cfp/aquaculture/multiannual-national-plans>.

Figure 21 Share of employment and gross value added by activity in aquaculture, 2017



Source: DCF and own calculations.

Figure 22 GVA and profits in EU aquaculture by activity, € million

Source: DCF and own calculations.

3.2.3. PROCESSING AND DISTRIBUTION

The EU has a high and growing demand for seafood, with consumption per capita levels of 25.1 Kg per year and large variation and differences across MS (from 55.9 Kg per capita in Portugal to 4.8 Kg per capita in Hungary). EU consumption is above world average (which is 21.2kg). The EU is the largest importer of seafood in the world.

Imports of seafood and fish products from around the globe also satisfy the needs of the processing and distribution sectors to have a steady supply of fish products for EU consumers over the year. Imports are the main source of raw material and main cost item for the EU fish-processing sector.

In 2017, the EU fish processing sector comprised 3,731 enterprises, employing around 118,533 persons, with a turnover of €29.1 billion and gross valued added exceeding €4.6 billion.

Trends and drivers

Landings of European vessels cover only approximately 40% of the total raw material requirements of the EU fish processing industry²⁶. The EU fish processing industry is therefore very dependent on global fish

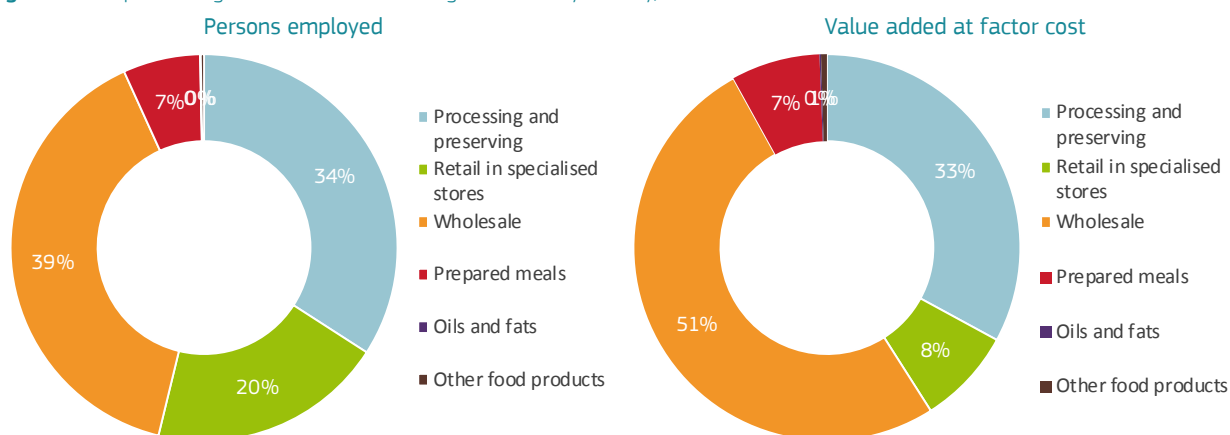
markets. Whether this dependency will be reduced as more stocks in European waters are fished at MSY level remains to be seen. The EU aquaculture production has an increasing role in supplying the EU fish-processing sector.

Raw material prices have not decreased over the last years, despite an increase in the supply, due partly to an increase in demand. The high percentage costs of raw material is expected to further increase. These costs are not expected to be offset by the improvements in efficiency (e.g. via innovations). Thus, the rising costs in raw materials and energy, is one of the main causes of the sector's low profit margins.

The EU fish-processing sector seems unable to fully translate the increase in costs into price due to the market power of wholesalers and retailers. Moreover, several Member States especially around the eastern Baltic Sea were and are still negatively affected by the Russian embargo and the subsequent substantial reduction in exports to Russia. Fish processing enterprises in many Member States seem to be more efficient in reacting to increasing costs than previously. Investments in the processing facilities across EU countries are also observed, particularly in countries with lower wages in an attempt to reduce costs and find workforce. In this context, the Baltic States and Poland report increasing investment and activity.

26. Scientific, Technical and Economic Committee for Fisheries (STECF) – Economic report of the EU fish processing sector 2017 (STECF-17-16). Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-67495-2, doi:10.2760/24311 JRC111988.

Figure 23 EU processing and distribution of living resources by activity, 2017



Source: Eurostat (SBS), DCF and own calculations.

Figure 24 GVA and profits in EU processing and distribution of living resources, € million



Source: Eurostat (SBS), DCF and own calculations.

3.3. MARINE EXTRACTION OF MINERALS, OIL AND GAS

Under the marine extraction of minerals, oil and gas (marine non-living resources), the extraction of crude petroleum, the extraction of natural gas, the extraction of marine minerals (aggregates) and the corresponding support activities are included. Other activities in the seabed that are still on an exploratory phase are discussed in Section 4.3.

The sector is mostly in decline due to decreasing production and rising costs. More than 80% of current European oil and gas production takes place offshore, mainly in the North Sea and to a lesser extent in the Mediterranean, Adriatic and Black seas.

MARINE EXTRACTION OF MINERALS, OIL AND GAS

Contribution to the EU blue economy: 4% of jobs / 13% GVA / 18% profits

In 2017, the sector employed 162 374 persons and generated EUR 22.8 billion in value added and EUR 13.1 billion in profits



Extraction of crude petroleum

- Status: Mature and in decline: ↘ jobs ↘ profits
- **GVA:** EUR 12.2 billion (-43%)
- **Jobs:** 21 275 persons (-1.2%)
- Actions: extend operations further offshore and decommissioning; transfer of technology and expertise to emerging sectors



Extraction of natural gas

- Status: Mature and contracting: ↘ jobs ↘ profits
- **GVA:** EUR 2.4 billion (-40%)
- **Jobs:** 14 683 persons (-16%)
- Actions: exploration of new fields in the Black and Adriatic seas



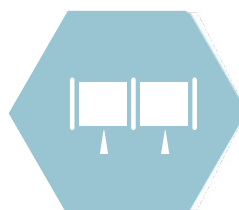
Extraction of marine aggregates

- Status: Mature and stable: ↘ jobs ↘ profits
- **GVA:** EUR 4.9 billion (-16%)
- **Jobs:** 81 549 persons (-24%)
- Actions: offshore seabed mining



Support activities for petroleum and natural gas

- Status: Mature and in decline: ↗ jobs ↘ profits
- **GVA:** EUR 2.6 billion (-23%)
- **Jobs:** 26 869 persons employed (+18%)
- Actions: new distribution pipelines Black sea



Support activities for other mining

- Status: Mature and expanding: ↗ jobs ↗ profits
- **GVA:** EUR 676 million (+422%)
- **Jobs:** 17 997 persons (+194%)
- Actions: new distribution pipelines Black sea

The EU-28 has around 600 active offshore platforms. Exploration in the North Sea is carried out by the United Kingdom, Denmark, the Netherlands and Germany. Minimal production occurs in the Baltic mainly along the Polish coast. In the Mediterranean, traditional production areas are located in Spanish, Greek, Maltese and Adriatic waters - mostly Italian but more recently, Croatian. Romania and Bulgaria are hydrocarbon producers in the Black Sea.

Overall, marine non-living resources contributed 4% of the jobs, 13% of the GVA and 18% of the profits to the total EU Blue Economy in 2017. The sector is in a decline driven by the offshore oil sector.

The sector directly employed 162,374 persons, 7.3% less than in 2009. Personnel costs totalled €9.7 billion, 1.4% less than in 2009. As personnel costs decreased less than persons employed, annual average wage, estimated at €61,000, increased slightly compared to 2009 (€59,000) (Figure 26). On the other hand, labour productivity was €156,000 per FTE in 2017, a substantial drop compared to 2009 (€224,500 per FTE).

Net investments in tangible goods reached almost €10.9 million in 2017, almost 4% less than in 2009. The ratio of net investment to GVA was estimated at 48% in 2017, up from 33% in 2009. New investments are being channelled into innovation, exploration and production units further offshore and in deeper waters.

Size of the EU Marine extraction of minerals, oil and gas in 2017

The GVA of the sector amounted to almost €22.8 billion, a 34.5% decrease compared to 2009. Gross profits, at €13.1 billion, shrunk by 47.4% on 2009 (€24.9 billion) (Figure 25). Reported turnover was €90.7 billion, a 26.9% decrease on the €124.1 billion turnover in 2009.

Sub-sectors and Member States

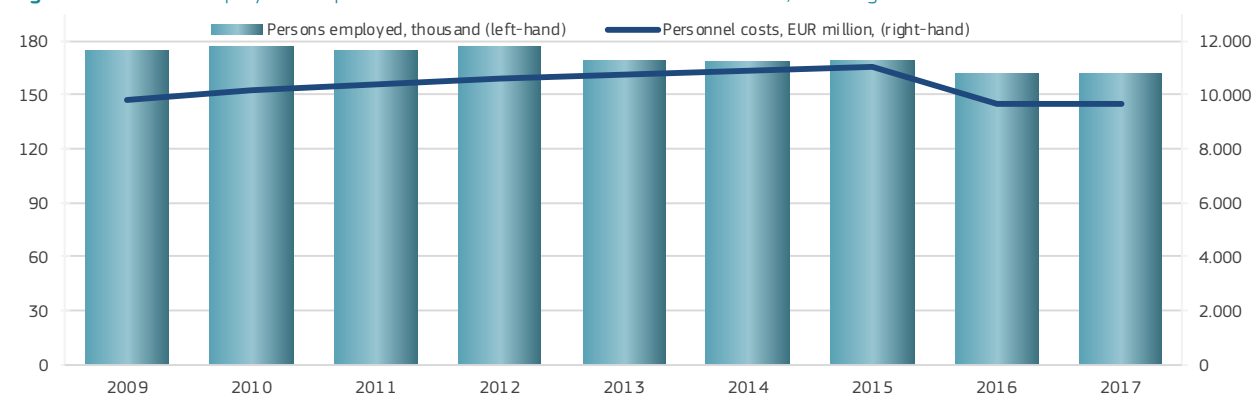
Employment: Marine extraction of minerals accounts for half of the persons employed, followed by support activities (combined) with 28% of the jobs, offshore oil at 13%, and then natural gas (9%) (Figure 27). Employment in the sector has fallen since 2009 in the extraction activities

Figure 25 Size of the EU marine extraction of minerals, oil and gas, € million

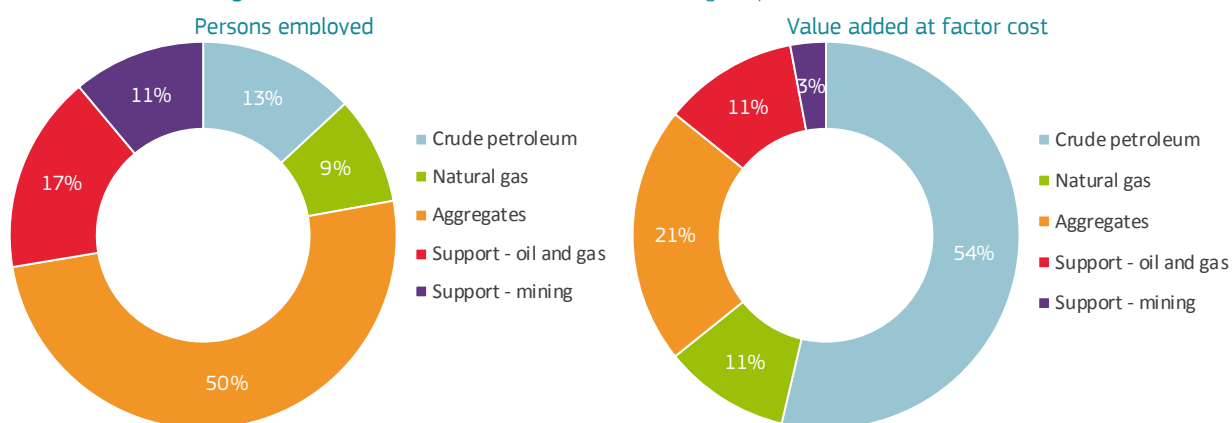


Source: Eurostat (SBS) and own calculations.

Figure 26 Persons employed and personnel costs in marine extraction of minerals, oil and gas



Source: Eurostat (SBS) and own calculations.

Figure 27 EU Marine extraction of minerals, oil and gas by sub-sector, 2017

Source: Eurostat (SBS) and own calculations.

(natural gas -16%, crude petroleum (-1.2% and minerals -24%), while it has increased in service activities (+18% for offshore oil and gas and +193.5% for aggregates). The important increase in support services for other mining (aggregates) is due to its initial very low values.

Turnover: Turnover amounted to €29.6 billion for extraction of crude petroleum, €37.1 billion for natural gas, €14.9 billion for marine aggregates, €8.1 billion for support services to oil and gas and €959 million for support services to other marine mining. Overall, turnover has decreased since 2009 in all the sub-sectors apart from the support services: by 40% in extraction of crude petroleum, by 18.3% in extraction of natural gas and by 22.9% in extraction of marine minerals. Support activities for offshore oil and gas increased a modest 1.9% while support services for other mining (aggregates) increased by 148.2%.

Gross value added: Extraction of crude petroleum accounts for 54% of the GVA generated, followed by marine aggregates at 21%, support activities (combined) at 14% and then extraction of natural gas (11%) (Figure 27). Overall, value added has fallen since 2009: by 43% in extraction of crude petroleum, by 39.5% in extraction of natural gas and 23.4% in support activities for offshore oil and gas. It increased by 412.8% in support services for other mining (aggregates) (Figure 28).

Gross profit: Bulk of profits are still generated by extraction of crude petroleum (75%, €9.3 billion). Gross profits suffered a significant fall compared to 2009 (47.4%): all sub-sectors saw declines except for support activities for other mining, which saw an 877% rise, from €33 million in 2009 to €320 million in 2017.

Net investment in tangible goods: The overall 3.7% fall in investments compared to 2009 was somewhat compensated by the service activities, both of which saw increases: 178% for other mining and 8.4% for oil and gas.

Trends and drivers

The EU's 2050 energy strategy²⁷ aims to reduce greenhouse gas emissions between 80% and 95%, when compared to 1990 levels, by 2050. The Energy Roadmap 2050²⁸ explores the transition of the energy system compatible with these greenhouse gas reductions goals, and at the same increase competitiveness and secure supply.

To achieve this greenhouse gas reductions target, significant investments need to be made in new low-carbon technologies, renewable energy, energy efficiency, and grid infrastructure. Because investments are made for a period of 20 to 60 years, policies that promote a stable business framework, which encourages low-carbon investments, need to be in place.

Natural gas should play a key role in achieving this reduction, even with current technologies in the short and medium term, until supply of renewable energies becomes the main source.

The United Kingdom leads the EU Marine extraction of minerals, oil and gas, generating 52% of the GVA and 27% of jobs in 2017 (Figure 29).

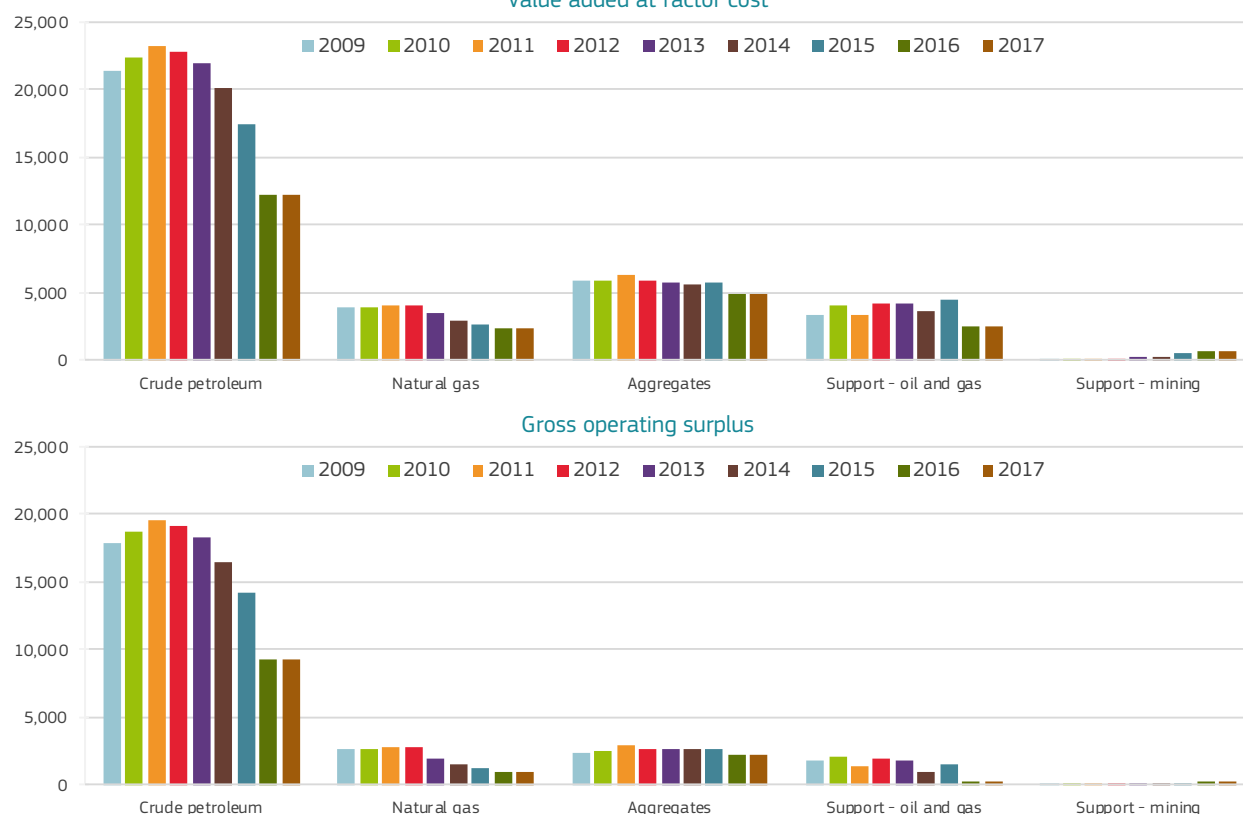
The EU imports more than half of the fossil fuel energy it consumes each year, with a particularly high level of dependency for crude oil and natural gas. The main extra-EU gas source for the EU are Russia, Norway and, LNG imports (from Qatar, Nigeria, etc.) and North Africa.

None of the EU Member States are self-sufficient in relation to their energy needs (as far as fossil fuels are concerned), with some smaller MS, such as Malta, Cyprus and Luxembourg, almost completely reliant on external supplies. At the other end of the range, Estonia and Denmark are much less reliant on imports to meet their energy needs

27. European Commission. 2050 Energy Strategy. Available at: <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2050-energy-strategy>

28. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Energy Roadmap 2050. COM(2011/0885 final. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/ELX_SESSIONID=pXNYJKSFbLwdq5JBWQ9CvYWYJxD9R-F4mn53ctywT2xXmFYhl-nlW1I-86876880?uri=CELEX:52011DC0885

Figure 28 GVA and profits in the EU Marine extraction of minerals, oil and gas by activity, € million
Value added at factor cost



Source: Eurostat (SBS) and own calculations.

Production of EU oil and gas is decreasing. Dutch gas production at Groningen field is set to further drop from a potential 19 bcm in 2018 to 5 bcm in 2023, and decreasing production will probably not be offset by the increase in another fields in the country²⁹.

Crude oil and petroleum products have had the largest share in energy consumption in the EU for decades. Despite decreasing crude oil production and consumption in the EU in recent years, crude oil and its derived products still remain the largest contributors to energy consumption³⁰.

Crude oil and gas prices have been relatively low in recent years, but recently increasing. Future fossil fuel prices are relatively uncertain. The reduction in EU demand for crude oil together with the potential reduction in the Chinese demand and increases in the world production of crude oil may lead to a decrease in oil prices. On the other hand, demand for gas is expected to continue increasing and, in consequence, so is its price.

The limited expected price increases, at least in the short term, together with a decreasing trend in production and increasing costs to exploit more remote reserves point to the continued deterioration of the economic performance of the sector.

Interaction with other sectors

The sector has developed technologies, infrastructure and operational skills of significant value to Blue Economy. With the depletion of many exploited fields and the start of dismantling, these strengths could prove very useful for the development of new offshore activities, such as floating offshore windfarms or geothermal power and structures such as multi-use platforms (see chapter 4.2 on blue energy).

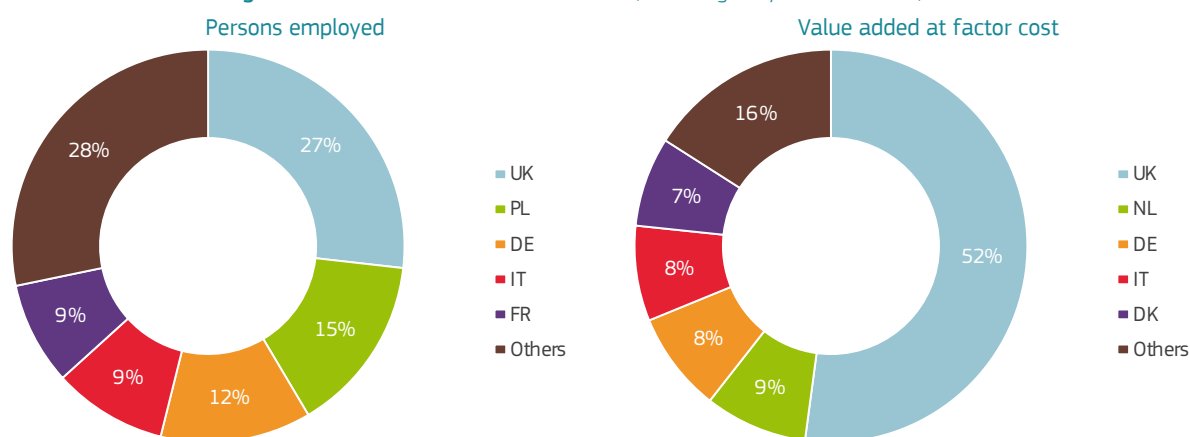
The Marine extraction of minerals, oil and gas may compete for the access to space with fishing, aquaculture, offshore wind energy and shipping. In particular, gravel extraction may conflict with fisheries because gravel beds are the principal spawning grounds for several commercially important species, such as herring.

Marine aggregates (sand and gravel)

Marine aggregates are naturally occurring sediment deposits found on the coastal areas of the continental shelf. They consist of sands, shells or shell debris, gravels, maerl, stones and pebbles. The extraction of aggregates is long established

29. European Commission - DG Energy. Quarterly Report. Energy on European Gas Markets. Market Observatory for Energy. Available at: <https://ec.europa.eu/energy/en/data-analysis/market-analysis>

30. Eurostat. Oil and petroleum products - a statistical overview. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Oil_and_petroleum_products_-_a_statistical_overview&oldid=315177#Imports_of_crude_oil

Figure 29 EU Marine extraction of minerals, oil and gas by Member State, 2017

Source: Eurostat (SBS) and own calculations.

in some European countries (e.g., Germany, the United Kingdom, Belgium and the Netherlands) to secure material used as construction aggregates, for beach nourishment and for land reclamation. However, marine aggregates, as a non-renewable resource, are conditioned. Moreover, they should be extracted and used in a sustainable manner and effective policies/regulatory frameworks and suitable maritime spatial planning need to be in place to address future demand.

The identification of potential deposit is often linked to marine research projects, such as general geological mapping of the seabed and/or habitat mapping. Different European countries have developed geological and seabed habitat maps of their coastal area. *EMODnet Geology*³¹ and *EMODnet Seabed Habitats*³² have succeeded in displaying harmonised broad-scale physical maps for all European sea-basins, including sea-floor geology, seabed habitat and mineral resources (including aggregate deposits).

According to *EMODnet Human Activities* data, between 2008 and 2017, about 150 million cubic metres of marine aggregates were extracted in Belgian, Danish, Spanish, Italian and Dutch waters (EEZ), in addition to 200 million tonnes in French and UK waters (Table 4). The exploration, exploitation, extraction and dredging of sand and gravel from the seabed are mainly used for beach nourishment and construction, but also for reclamation fill, port construction and agronomics (soil enrichment and wastewater treatment) (Table 5).

For the countries where data are available, a total of 834 licences for either exploration or extraction of marine aggregates have been identified by EMODnet Human Activities. Licences are mostly concentrated in waters (EEZ) belonging to the United Kingdom (294), the Netherlands (250) and Denmark (134).

Aggregate extraction and dredging are activities thought to potentially cause significant environmental impact. Both the operation of removing material from the bottom, as well as its relocation to another place can affect the marine ecosystem and other services for humans, such as fishing resources, beaches, etc. In Europe, dredging activities and the disposal of these materials are regulated by national authorities, normally based on international guidelines (e.g. OSPAR guidelines). To guarantee that these activities are environmentally sustainable, projects are normally subject to environmental impact assessments and consent and control procedures. Lastly, good maritime spatial planning could help mitigate competition for access and space by the different economic activities.

Ports, as multi-activity transport nodes, play a crucial role in the development of established and emerging maritime sectors. For the purposes of this report, this Blue Economy sector (also referred to as 'port activities'), includes: cargo handling, warehousing and storage, construction of water projects and service activities incidental to water transportation.

31. www.emodnet-geology.eu.

32. www.emodnet-seabedhabitats.eu

Table 4 Extraction of aggregates in a selection of EU countries. Million m³ or million t

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Belgium	2.3	2.0	2.2	2.9	3.2		5.8	2.8	3.0		24.2
Denmark					2.2					2.5	4.6
Spain	0.8		3.5				1.3				5.6
France		1.8	1.8	1.7	1.7						7.0
Italy					0.4	0.1	0.1		1.3		1.8
Netherlands	12.0	30.9	22.1	37.3	8.7						111.0
United Kingdom	21.5	20.2	16.1	19.1	16.8	16.0	17.2	19.5	18.8	19.0	184.3

Notes: Data in million m³ except for France and the UK (in million t).

Source: EMODnet Human Activities.

Table 5 Extraction of aggregates in a selection of EU countries by end use. 2008-2017

End use	Million m ³	Million t (UK and FR)
Agronomics	0.3	0.2
Beach nourishment	127.8	13.4
Construction	26.5	171.3
Port construction	2.5	
Reclamation fill		8.9
Others	4.8	8.2
Total	147.2	191.3

Notes: Some extractions may have several uses; therefore, the total does not necessarily correspond with the sum.

Source: EMODnet Human Activities.

Table 6 Number of licences for exploration or extraction of aggregates in a selection of EU MS EEZ

Country	Aggregates	Maerl	Sand	Gravel	Stone	Shells	Total
Belgium	23						23
Denmark	39		90	87	30		134
Finland			2	2			2
France	5	8	57	33		15	70
Germany			33	33			33
Italy			6				6
Lithuania			1	1			1
Poland	4		16	16			20
Sweden			1	1			1
The Netherlands			248			2	250
United Kingdom	294						294
Total	365	8	454	173	30	17	834

Source: EMODnet Human Activities.

3.4. PORTS, WAREHOUSING AND WATER PROJECTS

Port activities continue to play a key role in trade, economic development and job creation. According to the European Sea Ports Organization, 90% of Europe's cargo trade in goods passes through the more than 1 200 seaports in the 23 maritime EU member states. Many of these ports also receive hundreds of millions of passengers aboard cruises liners and ferries.

The number of containers heading into European ports has risen by more than four times over the past 20 years³³. Europe's busiest port is Rotterdam (NL), with around 11% of the total cargo handled in 2017, followed by Antwerp, 5% (BE); Hamburg, 3% (DE); Amsterdam, 3% (NL) and Algeciras, 2% (ES).

PORTS, WAREHOUSING AND CONSTRUCTION OF WATER PROJECTS

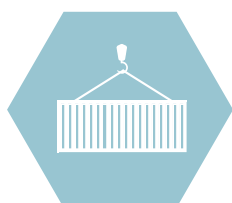
Contribution to the EU blue economy: 14% of jobs / 19% GVA / 18% profits

The sector employed 574 072 persons and generated EUR 34.4 billion in value added and EUR 13.6 billion in profits



WAREHOUSING AND STORAGE

- Status: Mature and growing: ↗ jobs ↗ profits
- **GVA:** EUR 14.4 billion (+58%)
- **Jobs:** 322 605 persons (+76%)
- Actions: Strategic investments, new infrastructures (superstructures for ever larger vessels)



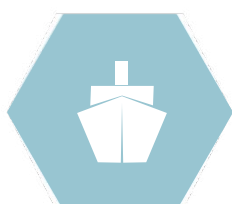
CARGO HANDLING

- Status: Mature and stagnated to increasing: ↘ jobs ↗ profits
- **GVA:** EUR 3.7 billion (+15%)
- **Jobs:** 61 915 persons (-3.5%)
- Actions: Strategic investments in infrastructures and links to consumer/producer centres



CONSTRUCTION OF WATER PROJECTS

- Status: Mature and in decline: ↘ jobs ↘ profits
- **GVA:** EUR 3.2 billion (-40%)
- **Jobs:** 65 168 persons employed (-32%)
- Actions: Investment and innovation; adaptation for climate change



SERVICE ACTIVITIES INCIDENTAL TO WATER TRANSPORTATION

- Status: Mature and increasing: ↗ jobs ↗ profits
- **GVA:** EUR 13.1 billion (+25%)
- **Jobs:** 124 384 persons (+12%)
- Actions: Strategic planning

EU Port activities accounted for 14% of the jobs, 19% of the GVA and 18% of the profits in the total EU Blue Economy in 2017. The sector has grown, in terms of jobs and GVA, since 2009.

Size of EU Port activities in 2017

The value added generated by the sector grew by 21.9% from 2009 to 2017, reaching €34.4 billion. Gross profit, at €13.6 billion, was 9.2% higher than in 2009 (Figure 30). Turnover amounted to €89.2 billion, a 36% rise on 2009.

Employment and average wages have risen in the last few years. This sector is estimated to directly employ 574,072 persons in 2017, 26% more than in 2009, while total personnel costs increased by 32.4%, to €20.83 billion (Figure 31). This represented a 5% increase in average wages compared to 2009. The average annual wage was estimated at €36,277. With job growth outpacing GVA, labour productivity, reaching €68 158 per FTE in 2017, fell 2.8% compared to €70 111 per FTE in 2009.

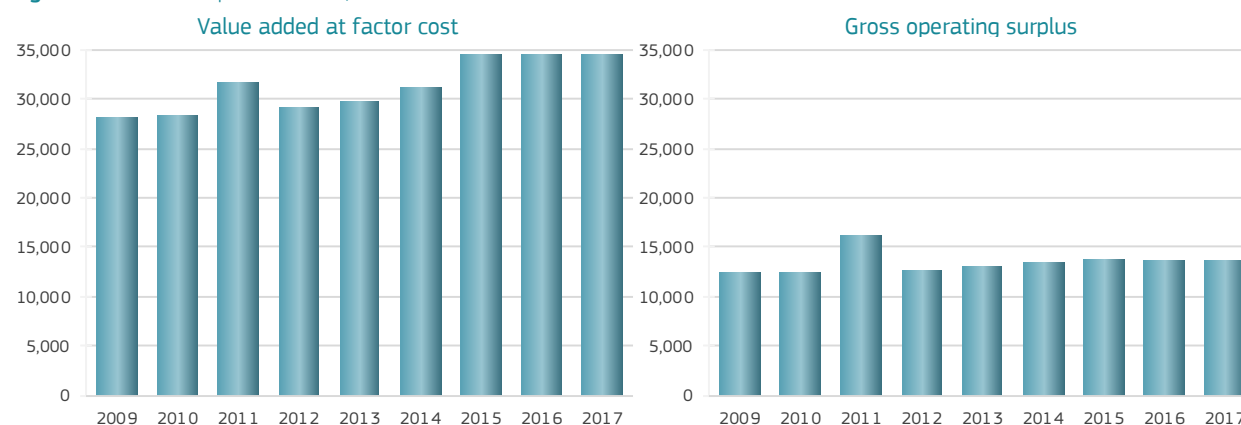
Sub-sectors and Member States

Employment: The bulk of the employment (56%) is located in warehousing, with 322,695 direct jobs in 2017. Service activities accounted for a further 22%, followed by water projects and cargo handling (both with 11%). Compared to 2009, the number of jobs in water projects decreased by 32% and by 3.5% in cargo handling. These losses were counterbalanced by growths in warehousing (+75.5%) and service activities (+11.6%) (Figure 32).

Turnover: Total turnover amounted to €89.2 billion in 2017: €46.6 billion in warehousing and storage, €22.8 billion in support services, €11 billion in water projects and €8.8 billion in cargo handling. Water projects saw a 28% decrease compared to 2009. This loss was counterbalanced by increases in warehousing (86.3%), cargo handling (22.3%) and service activities (26.4%), resulting in a 36% overall increase in the sector.

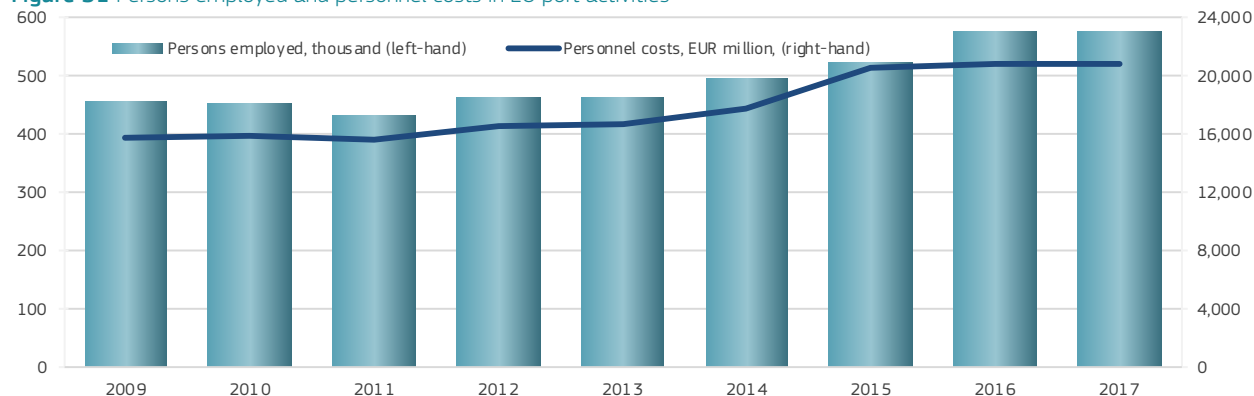
Gross value added: Similarly to employment, most of the value added is generated in warehousing and storage, accounting for 42% of the GVA, followed

Figure 30 Size of EU port activities, € million



Source: Eurostat (SBS) and own calculations.

Figure 31 Persons employed and personnel costs in EU port activities



Source: Eurostat (SBS) and own calculations.

34. Net investments in tangible good are unavailable for most of the sub-sectors.

35. Investments in port infrastructures are eligible for EU co-financing through the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) under shared management, but also through the Trans-European Net-works-Transport (TEN-T) and the Connecting Europe Facility (CEF) under the direct management of the European Commission. Overall, between 2000 and 2013, around €6.8 billion of funding were provided from the EU budget for investments in ports. In addition to funding from the EU budget, the European Investment Bank (EIB) financed port investments in the form of loans amounting to around ERU 10.1 billion

36. SWD(2013) 181 final of 23 May 2013 'Impact assessment accompanying the document Proposal for a Regulation of the European Parliament and the Council establishing a framework on market access to port services and financial transparency of ports'.

by service activities at 38%, cargo handling (11%) and then water projects (9%) (Figure 32). Water projects saw a 40% decrease compared to 2009. These losses were counterbalanced by increases in warehousing (+58%), cargo handling (+15%) and service activities (+24.5%).

Gross profit: The bulk of profits are generated in service activities (51% of profits), followed by warehousing (36%), cargo handling (9%) and water projects (5%). The modest growth (+9.2%) in profits was mostly the result of a decline in water projects (down 74% compared to 2009), while other industries improved significantly on their 2009 results: cargo handling rose by 30.4%, warehousing by 39% and service activities by 22.5%.

Gross investments in tangible goods³⁴: Most of the investments went to service activities (53%), which saw a 5.8% drop on 2009 figures. Overall, the sector saw only a decrease (1.3%), largely due to substantial increases in cargo handling and warehousing (+35.9% and +11% respectively), as all other sub-sectors disinvested.

The United Kingdom leads EU port activities, accounting for 21% of the GVA and generating 28% of the jobs. Germany closely follows in terms of jobs and GVA (Figure 33).

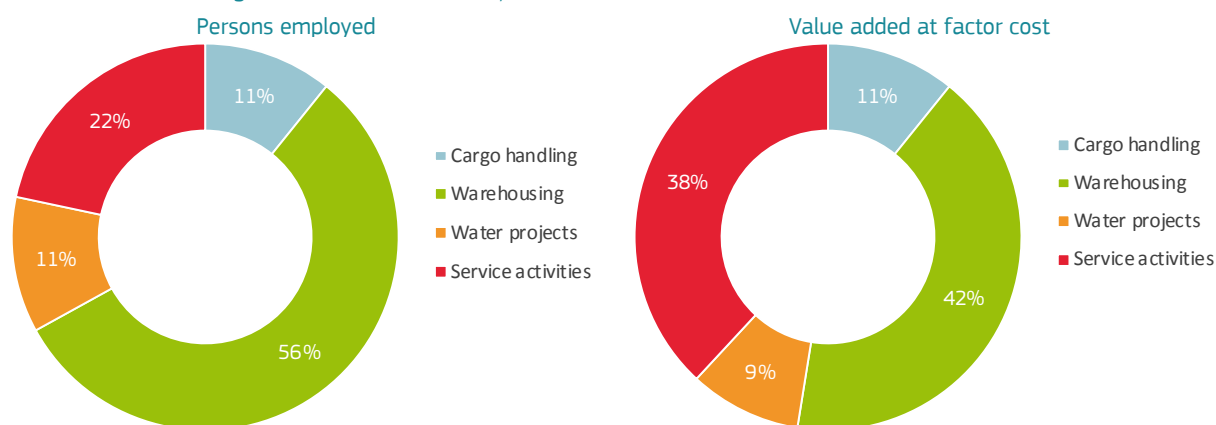
Trends and drivers³⁵

Seaports are economically very important in the EU, as they are key nodes in the global trade network, handling a large share of all the EU's cargo. However, EU ports are very heterogeneous, with significant differences in their size, type, organisation and in how they are connected to their hinterlands. Efficiency and productivity vary greatly between ports, and these differences have increased further in recent years³⁶.

Ship sizes for all segments (e.g. tankers, container carriers) have increased in recent years in order to lower costs, increase operational efficiencies and improve the carbon footprint of Maritime transport. Larger ships lead to lower average transport costs, and thus have replaced smaller ones. However, larger ships require new ports infrastructure and have an impact on competition between port authorities and port operators.

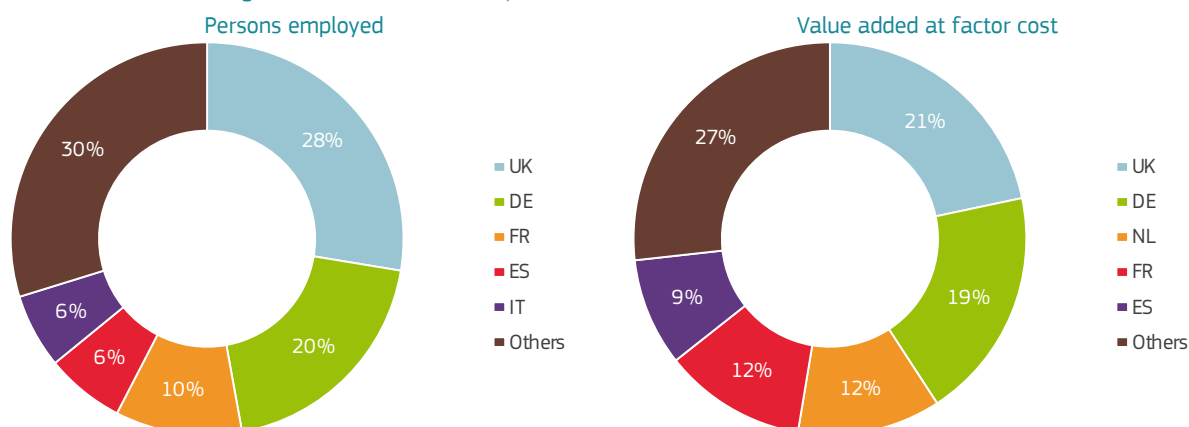
Most ports in the EU are publicly owned. The port authority owns the basic infrastructure and leases it out to port operators, usually by means of a concession, while retaining all regulatory functions. Hence, port operations are run by private companies, which provide and maintain their own superstructure, including buildings

Figure 32 EU Port activities by sub-sector, 2017



Source: Eurostat (SBS) and own calculations.

Figure 33 EU Port activities by Member State, 2017



Source: Eurostat (SBS) and own calculations.

and cargo-handling equipment at the terminals. Port authorities have often limited autonomy in setting port charges, because governments often delineate them and because they compete with other ports.

However, ports need to invest in infrastructure, in particular for additional capacity and new port infrastructure and superstructures due to the increase in the ship sizes. Given the size of these new ships and the cargo they carry, investments need to go beyond the ports to ensure adequate connections through inland waterways, road and rail to major production and consumption markets.

Interaction with other sectors

Port activities provide the basic infrastructure for many other sectors including fishing, transport, marine extraction of minerals, oil and gas, marine renewable energy or maritime tourism. In this context, ports may act as facilitators of economic and trade development for their hinterland. On the other hand ports may compete for space, for instance, with respect to aquaculture.

3.5. SHIPBUILDING AND REPAIR

For the purpose of this report, the Shipbuilding and repair sector includes the following activities: Building of ships and floating structures, building of pleasure and sporting boats, repair and maintenance of ships and boats, marine equipment (manufacture of cordage, rope, twine

and netting, manufacture of textiles other than apparel, manufacture of sport goods) and marine machinery (manufacture of engines and turbines, except aircraft and manufacture of instruments for measuring, testing and navigation).

SHIPBUILDING AND REPAIR

Contribution to the EU blue economy: 8% of jobs / 8% GVA / 5% profits

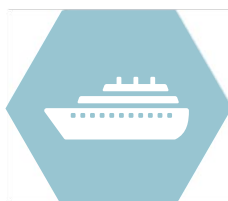
The sector employed 315 150 persons and generated EUR 14.8 billion in value added and EUR 3.6 billion in profits



BUILDING OF SHIPS AND FLOATING STRUCTURES

Status: Mature and growing: ↗ jobs ↗ profits

- **GVA:** EUR 6.5 billion (+11%)
- **Jobs:** 119 148 persons (+76%)
- Actions: competitive advantage in specialised niches, investment and innovation



BUILDING OF PLEASURE AND SPORTING BOATS

Status: Mature and stagnated to increasing: ↘ jobs ↗ profits

- **GVA:** EUR 2.4 billion (+16%)
- **Jobs:** 50 803 persons (-3.5%)
- Actions: increase market share by taking advantage of the competitive EU marine machinery and equipment industries



MARINE MACHINERY

Status: Mature and in decline: ↘ jobs ↔ profits

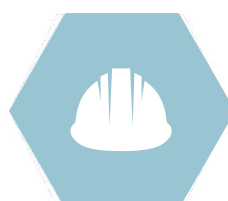
- **GVA:** EUR 1.9 billion (0%)
- **Jobs:** 23 722 persons employed (-14%)
- Actions: maintain high market share through investment and innovation



MARINE EQUIPMENT

Status: Mature and increasing: ↗ jobs ↗ profits

- **GVA:** EUR 704 million (+173%)
- **Jobs:** 19 758 persons (+119%)
- Actions: maintain high market share through investment and innovation



REPAIR AND MAINTENANCE OF SHIPS AND BOATS

Status: Mature and increasing: ↗ jobs ↗ profits

- **GVA:** EUR 3.3 billion (+22%)
- **Jobs:** 101 719 persons (+13%)
- Actions: Investment in infrastructures to meet growing demands

Shipyards are clearly identified as working 100% in the domain of the Blue Economy. However, the equipment and machinery that is incorporated in the vessels is produced by companies working for both maritime and non-maritime industries. This edition of the Blue Economy Report includes a first attempt to incorporate the sector of equipment and machinery within the remit of the Blue Economy. SBS data has been complemented with the identification of specific PRODCOM codes, specifically connected with maritime equipment and machinery³⁷.

This approach constitutes an important improvement with respect to the previous edition, but remains incomplete. PRODCOM items do not necessarily reflect the whole range of systems and equipment that are usually installed on board the ships built in EU and exported to shipyards outside the EU. The goal is to continue to better the methodology in upcoming editions of this report. In 2017, the Commission funded a study to analyse the shipbuilding value chain in Europe and globally. The data on this study can complement the analysis presented here (see Box 1). In addition, shipbuilding is an industry with multiple indirect and induced effects (see Section 6.1 for an illustration).

There are more than 300 shipyards in the EU, most of which are active in the global market for high-tech civilian and naval vessels. The EU shipbuilding industry is a dynamic and competitive sector. The EU is a major player in the global shipbuilding industry, with a market share of around 6% of the global order book in terms of compensated gross tonnage³⁸ and 19% in terms of value; for marine equipment, the EU share rises to 50%³⁹.

The EU is specialised in segments of shipbuilding (cruise ships, offshore support vessels, fishing, ferries, research vessels, dredgers, mega-yachts, etc.) with high level of technology and added value. This specialisation and leadership position is a direct result of the sector's continuous investments in research and innovation as well as in a very highly skilled workforce. The EU is also global leader in the production of high tech, advanced maritime equipment and systems. Indeed, the EU maritime technology sector is one of the most innovative sectors in Europe with 9% of turnover invested in research and development.

However, low prices for new merchant ships, driven by overcapacity in major market segments, are pushing Asian shipyards to focus their attention on European niche markets and higher technology / high added value products.

European shipbuilders are reducing costs and restructuring capacity by adjusting their production programmes and optimising the supply chain. Indeed, figures show a significant

drop in shipbuilding employment since 2009. The economic and financial crisis affected the industry globally for several years, after this the business model has changed and part of the workforce shifted to external subcontractors and suppliers (see Section 6.2 for an example of the indirect and multiplicative effects of shipyards).

The decline, particularly in Germany, Poland and Spain, has not been offset by a slight increase seen in the United Kingdom. The falling oil price has also had an impact on European construction of offshore platforms and supply vessels. Results indicate that the sector is recovering.

Overall, Shipbuilding and repair accounted for 8% of the jobs, 8% of the GVA and 5% of the profits in the total EU Blue Economy in 2017. The sector has expanded slowly from recent lows in 2009 and 2013.

Size of EU Shipbuilding and repair in 2017⁴⁰

The GVA in the sector was valued at just over €14.8 billion, up 15.6% compared to 2009. Labour productivity, hitting a low in 2009 with €43,300 per FTE, increased to €53,900 per FTE. Gross profit, at €3.6 billion, was 75.9% higher than the 2009 figure (€2 billion) (Figure 34). Reported turnover was €53.8 billion, a 4.5% rise on 2009.

Around 315,150 persons were directly employed in the sector (down 8.8% since 2009). On the other hand, personnel costs increased 4.5% compared to 2009 (Figure 35). With a total of €11.3 billion in personnel costs, the average wage was €36,600, up from €31,800 in 2009.

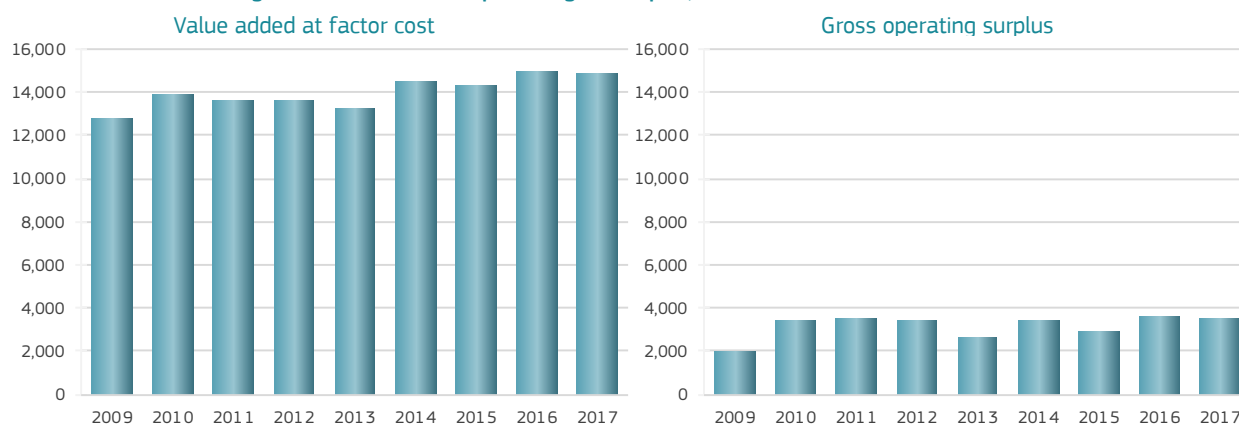
37. See Annex II for further details.

38. Source: Sea Europe.

39. Balance (2017).

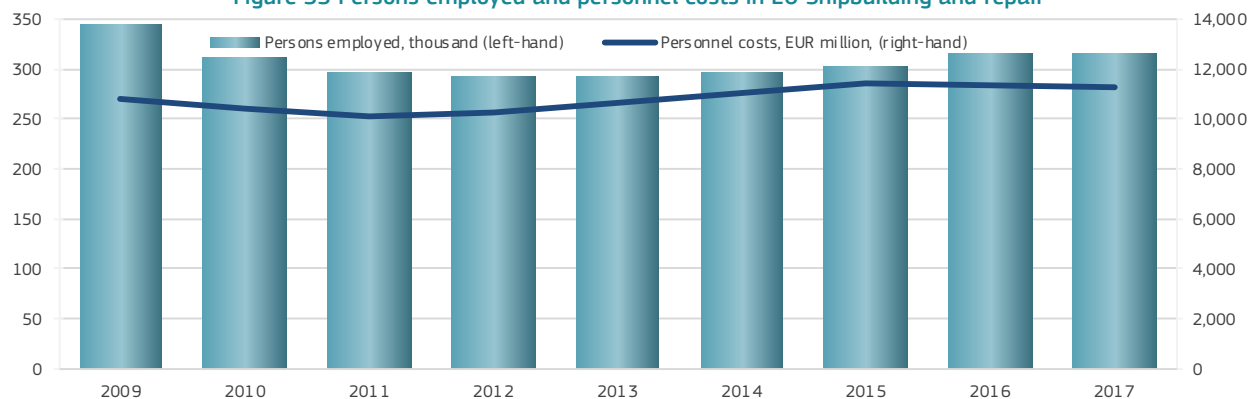
40. Data for 2017 are provisional and subject to revision. Anecdotal evidence indicates there was a strong growth between 2016 and 2017 in the EU shipbuilding and repair sector and, therefore, figures may be reviewed upwards in future updates.

Figure 34 Size of EU Shipbuilding and repair, € million



Source: Eurostat (SBS) and own calculations.

Figure 35 Persons employed and personnel costs in EU Shipbuilding and repair



Source: Eurostat (SBS) and own calculations.

BOX 1 THE SHIPBUILDING VALUE CHAIN

In 2017, the European Commission financed a study to obtain an overview of the global shipbuilding supply-chain industry, covering basic economic and company characteristics, and including available products and services⁴¹. The study also evaluates national competitive market positions and tries to identify new trends in globalisation and the consequences for European Industrial and Trade Policy.

The study analyses shipbuilding *stricto sensu* plus the value chain through the first tier and second tier equipment suppliers. According to the study, the EU shipbuilding generated an overall production of €41 billion and employed 225 000 people in more than 22,000 companies. The **first tier of the shipbuilding supply chain** reached an overall annual production of €44.5 billion, in part building on exports. It engaged more than 231,000 employees in more than 28,000 enterprises across Europe. The study also identifies a group of sub-suppliers in the **second tier of the shipbuilding supply chain** with a total production of €26.8 billion with 109,000 employees. The first and second tier suppliers of marine equipment and machinery combined generate 340,000 employees and a production of €71.3 billion.

41. BALance (2017): *Study on New Trends in Globalisation in Shipbuilding and Marine Supplies*. EASME. ISBN 978-92-9202-325-6.

Sub-sectors and Member States

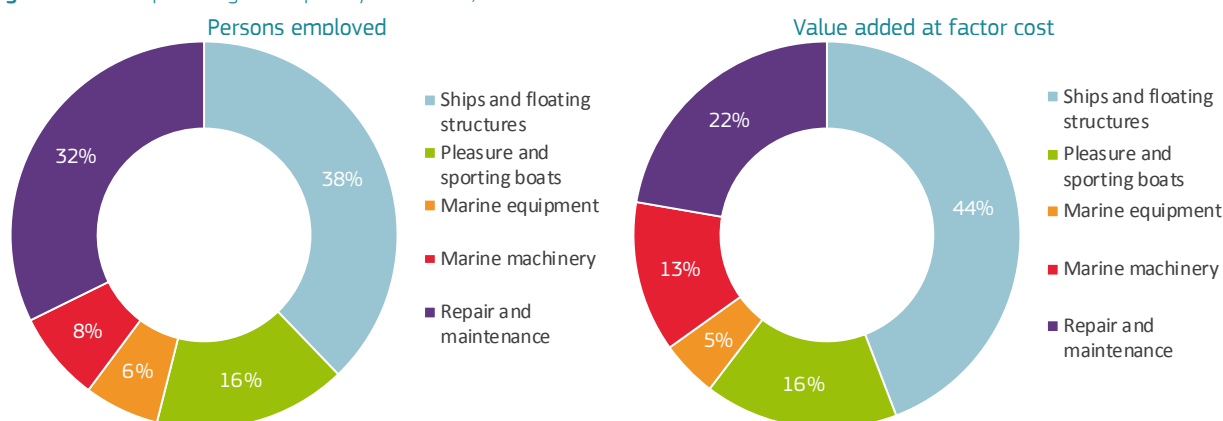
Employment: Around 119,148 people work in the building of ships and floating structures, accounting for 38% of the jobs (Figure 36). The top MS employers are Germany, the UK and Italy (Figure 37). The fall in employment over the period was mostly in this sub-sector, which saw a 28% decrease compared to 2009. Conversely, repair and maintenance increased by 12.8% and marine equipment by 199% (Figure 38).

Turnover: Turnover amounted to €25.7 billion for building of ships and floating structures, €9.2 billion for pleasure and sporting boats, €2.1 billion for marine equipment, €6.9 for marine machinery and €9.8 billion for Repair and maintenance. Building of ships and floating structures, building of pleasure boats and marine machinery all saw turnover drop compared to 2009 (4.8%, 0.6% and 3.5% respectively). These losses were counterbalanced by significant increases in marine equipment (+133%) and Repair and maintenance (+37.9%).

Gross value added: Most of the value added was generated in building of ships and floating structures (53%), followed by repair and maintenance (22%) and building of pleasure and sporting boats (16%). The top MS producers are Germany and the UK (Figure 37). All sub-sectors, apart from marine machinery, which remained unchanged, saw increased GVA compared to 2009: a 10.8% increase in the building of ships and floating structures; 16% increase in the building of pleasure and sporting boats, 21.8% increase in repair and maintenance and 173% in marine equipment (Figure 38).

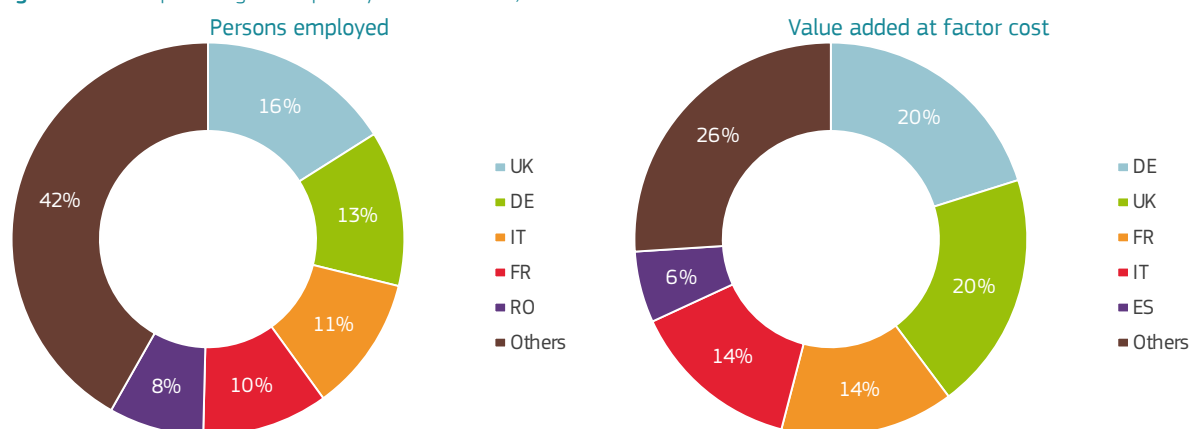
Gross profit: The bulk of profits are generated by building of ships and floating structures (€1.4 billion), followed by repair and maintenance (€991 million) and then building of pleasure and sporting boats (€511 million). Profits rose almost 80% compared to 2009, due to increases in most sub-sectors but in particular building of ships and floating structures (+174%).

Figure 36 EU Shipbuilding and repair by sub-sector, 2017



Source: Eurostat (SBS) and own calculations.

Figure 37 EU shipbuilding and repair by Member State, 2017



Source: Eurostat (SBS) and own calculations.

Net investment in tangible goods: Net investment reached almost €1.3 billion in 2017. Overall, investments decreased by 21.4% on 2009 figures. Building of pleasure and sporting boats has suffered substantial disinvestment; decreasing 115% compared to 2009 and was the only sub-sector to report a negative net investment in 2017. Repair and maintenance also saw investments decline by 45.8% compared to 2009.

Germany leads the EU Shipbuilding and repair, accounting for 16% of the jobs and 20% of the GVA (15%), closely followed by the UK (Figure 37).

Trends and drivers

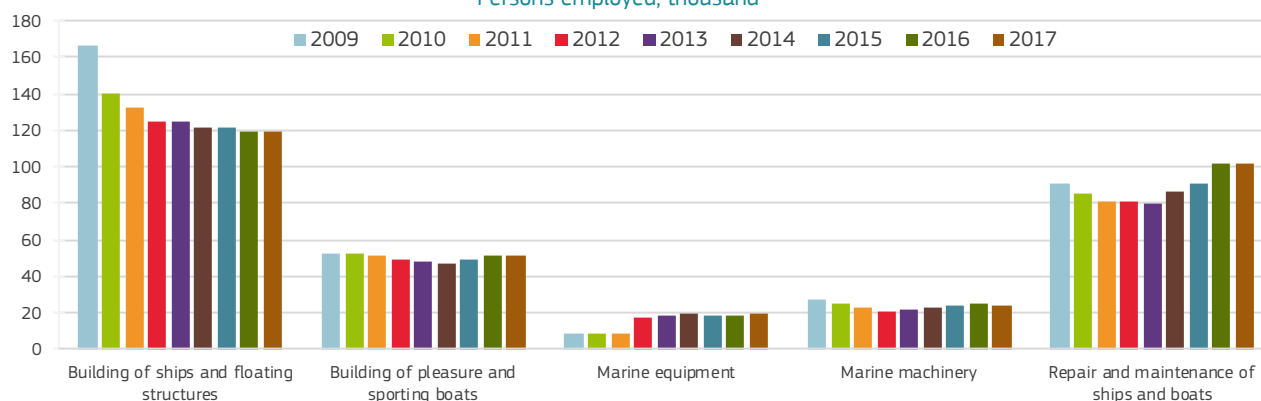
The sector faces fierce and increasing international competition from countries like China and South Korea, who are trying to enter the European niche markets of specialised high tech ships given the crisis and the oversupply in the cargo markets. The industry has also suffered from the economic

and financial crisis, the absence of effective global trade rules and state supported overinvestment. This latter is because shipyards are considered strategic in all competing countries outside of Europe, as they offer a wide range of technologies, employ a significant number of workers, and generate foreign currency income (as it is dollar-based).

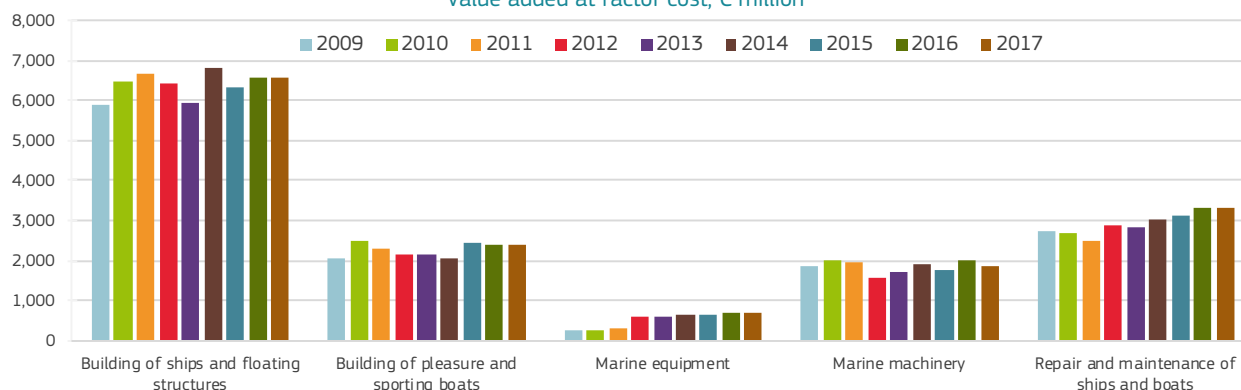
Interaction with other sectors

Shipbuilding provides the assets, capabilities, technologies and knowhow for several Blue Economy activities such as fishing, transport, marine extraction of minerals, oil and gas, offshore renewable energies, aquaculture and tourism. The EU Shipbuilding and equipment sectors have new opportunities, especially working alongside emerging sectors, such as assistance vessels and structures for marine renewable energy (e.g. offshore wind and ocean energy) and the exploration and exploitation of the deep-sea.

Figure 38 Persons employed and GVA in the EU Shipbuilding and repair by activity
Persons employed, thousand



Value added at factor cost, € million

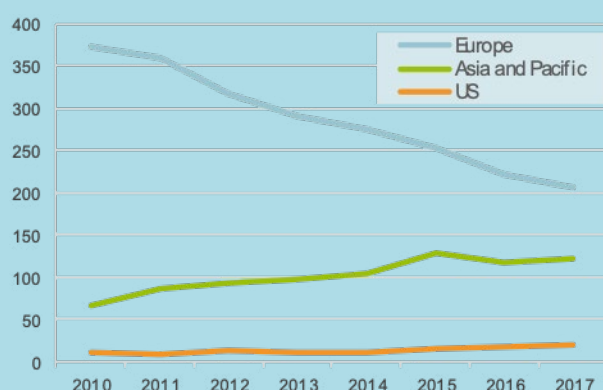


Source: Eurostat (SBS) and own calculations.

BOX 2 INVESTMENTS AND FINANCING IN SHIPYARDS: OPPORTUNITIES AND CHALLENGES

Being a capital-intensive industry, shipbuilding requires access to the banking sector. Capital markets can also be a source of finance as well as governments through various types of grants; however, bank financing remains the main source of funding for the building of new vessels or the conversion and retrofitting of existing vessels. The exposure of the top 40 banks to the global shipbuilding industry has declined from a peak of \$460 billion in 2008, to \$345 billion in 2017⁴². This has been mainly driven by European banks, which have significantly decreased their exposure to shipping financing on the wake of the global financial and economic crisis (from \$360 billion in 2010 to \$205 billion in 2017, see Figure 39).

Figure 39 Exposures to shipping finance by the top 40 banks, regional aggregate, \$ billion



Source: Petrofin Global Bank Research 2018.

Consequently, the share of European banks in shipping financing has decreased from 83% in 2010 to 59% in 2017 (51% from EU Member States) and has been replaced by Asian players. Indeed, South Korean and China have been providing capital support (including subsidies) to international shipping companies purchasing vessels built in their local shipyards. Despite the decrease in the share, 24 out of the top 40 banks are still EU based (Figure 40). German, French and Scandinavian banks concentrate 75% of the EU exposures to global shipping companies.

Figure 40 Exposures to shipping finance by the top 40 banks, \$ billion, 2017



Source: Petrofin Global Bank Research 2018.

42. Petropoulos, T. (2018): *Key Developments and Growth in Global Ship-Finance*. Petrofin Global Bank Research.

The reduction in the exposures of European banks to the shipping industry reduces the financial income that remains in Europe. However, beyond the business decisions taken based on risk perception and the evolution of the shipbuilding market, a reinforced position of Asian and Chinese banks can give these countries some (geo) strategic power as they can decide about the kind of projects and companies to be or not financed.

As an alternative to bank financing, shipping companies can also access financial markets through the issuance of bonds and other securities. Moreover, government financing is an additional source of funding that can also be used to steer the industry in one direction, such as in greening shipbuilding. In March 2017, the *Valleta Declaration* of the Council of the EU established competitiveness, decarbonisation and digitalisation as the priorities for the EU's Maritime transport policy up to 2020 and beyond.

In this context, the European Union, through the EIB, launched the Green Shipping Guarantee Programme⁴³ and the Green Shipping Programme Loan⁴⁴ in 2016. Both programmes promote the construction or retrofitting of vessels for the acceleration of the investment in greener vessels, for instance using alternative propulsion systems. The funds are channelled through a set of platforms combining EFSI and CEF⁴⁵. The EIB will provide €750 million guarantees for an expected investment of €3 billion and loans up to €250 million for an expected investment of €500 million.

43. For further details see: <https://www.eib.org/en/projects/pipelines/pipeline/20150334?f=search&-media=search>.

44. For further details see: <https://www.eib.org/en/projects/pipelines/pipeline/20150742?f=search&-media=search>.

45. European Fund for Strategic Investment (EFSI) and Connected Europe Facility (CEF).

3.6. MARITIME TRANSPORT

Maritime transport is essential to the world's economy. Moreover, there is little if any dispute over the fact that shipping is the most carbon-efficient mode of transportation. International maritime shipping accounts for less than 3% of annual global greenhouse gas emissions (CO₂)⁴⁶ and produces less exhaust gas emissions – including nitrogen oxides, hydrocarbons, carbon monoxide and sulphur dioxide – for each tonne transported per one kilometre than air or road transport⁴⁷. The size and global nature of the

shipping industry makes it vital that the industry continues to reduce its environmental impact, and the industry has made significant progress in fuel efficiency.

Due to the expected growth of the world economy and associated transport demand from world trade, greenhouse gas emissions from shipping could grow from 50% to 250% by 2050⁴⁸, making it paramount for the industry to continue to improve energy efficiency of ships and to shift to alternative fuels.

MARITIME TRANSPORT

Contribution to the EU blue economy: 6% of jobs / 12% GVA / 16% profits

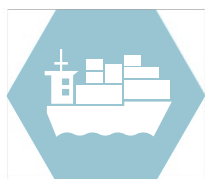
The sector employed 232 241 persons and generated EUR 21.9 billion in value added and EUR 11.9 billion in profits



SEA AND COASTAL PASSENGER WATER TRANSPORT

Status: Mature and growing: ↗ jobs ↗ profits

- **GVA:** EUR 7.7 billion (+37%)
- **Jobs:** 91 235 persons (+15%)
- **Actions:** Improve security and reduce environmental impact; increase local benefit from cruise tourism



SEA AND COASTAL FREIGHT WATER TRANSPORT

Status: Mature and contracting: ↘ jobs ↘ profits

- **GVA:** EUR 11 billion (-18%)
- **Jobs:** 84 916 persons (-18%)
- **Actions:** Improve security and reduce environmental impact (water quality, marine litter)



INLAND PASSENGER WATER TRANSPORT

Status: Mature and in decline: ↗ jobs ↗ profits

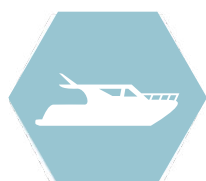
- **GVA:** EUR 822 million (+52%)
- **Jobs:** 21 372 persons employed (+17%)
- **Actions:** reduce environmental impact (water quality, marine litter)



INLAND FREIGHT WATER TRANSPORT

Status: Mature and increasing: ↘ jobs ↘ profits

- **GVA:** EUR 775 million (-18%)
- **Jobs:** 22 191 persons (-5%)
- **Actions:** reduce environmental impact (water quality, marine litter)



RENTING AND LEASING OF WATER TRANSPORT EQUIPMENT

Status: Mature and increasing: ↘ jobs ↘ profits

- **GVA:** EUR 1.6 billion (-18%)
- **Jobs:** 12 527 persons (-14%)
- **Actions:**

46. International Maritime Organization (IMO) expert working group <http://www.imo.org>.

47. Swedish Network for Transport and the Environment.

48. <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Greenhouse-Gas-Studies-2014.aspx>

Maritime transport plays a key role in the EU economy and trade, estimated to represent between 75% and 90% (depending on the sources) of the EU's external trade and one third of the intra-EU trade. Moreover, more than 400 million passengers aboard cruises and ferries embark and disembark at EU ports each year.

In 2016, the total weight of goods transported to/from main ports in the EU-28 by short sea shipping (excludes the movement of cargo across oceans, deep sea shipping) was 2,531 million tonnes.

For the purpose of this report, Maritime transport includes sea and coastal passenger water transport, sea and coastal freight water transport, inland passenger water transport, inland freight water transport and the renting and leasing of water transport equipment. Inland transport is considered part of the Blue Economy because it includes transport of passengers and freight via

rivers, canals, lakes and other inland waterways, including within harbours and ports.

Overall, Maritime transport accounted for 6% of the jobs, 12% of the GVA and 16% of the profits in the total EU Blue Economy in 2017. The sector is undergoing a slow recovery.

Size of EU Maritime transport in 2017

Around 232,241 persons were directly employed in the sector (1.2% less than in 2009). Total wages and salaries amounted to €8.6 billion and the annual average wage was estimated at €36,900, up 9.8% compared to 2009.

GVA generated by the sector amounted to just over €21.9 billion, slightly down compared to 2009. Labour productivity, hitting a low in 2009 (€96,400

Figure 41 Size of EU Maritime transport, € million

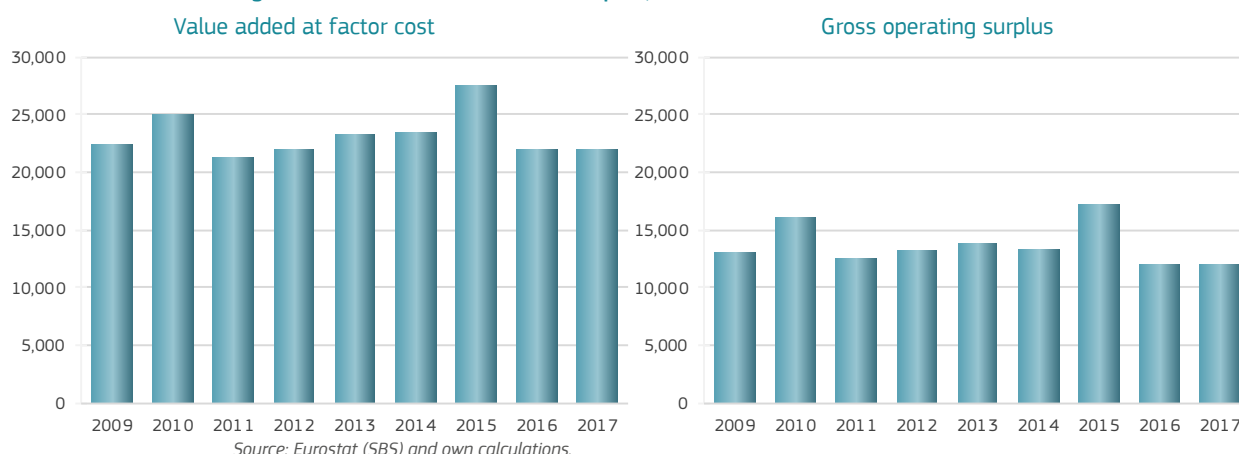
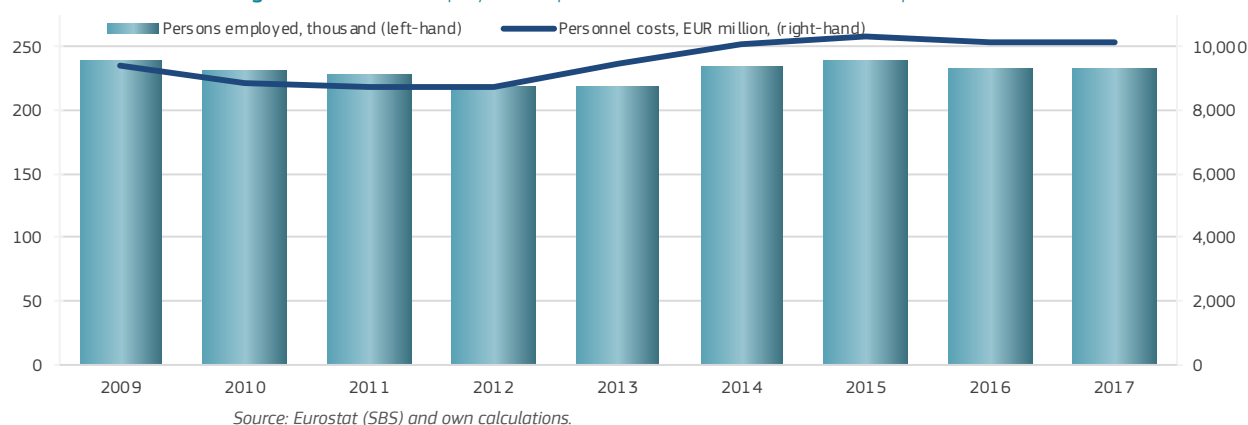


Figure 42 Persons employed and personnel costs in EU Maritime transport



per FTE), increased in 2016, reaching €117,000 per FTE. Gross profit, at €17.1 billion, increased by 28% on 2009 (€13.4 billion). The profit margin was estimated at 15%, an improvement on 13.3% in 2009. The investment ratio (gross investment in tangible goods / GVA) was estimated at 44%, still well below the figure for 2009 (71%) (Figure 41). Turnover was reported €111.1 billion, a 10% increase on 2009.

Sub-sectors and Member States

Employment: Sea and coastal transport account for 76% of the jobs: 39% for passenger and 37% for freight. Inland transport generates a further 19% (9% and 10% for passenger and freight transport, respectively). Renting of equipment accounts for the remaining 5% (Figure 43). The fall in employment since 2009 was mostly in sea and coastal freight transport (down 17.7%) and renting of equipment (down 14.4%). This could be explained, at least in part, by technological improvements on board. In contrast, employment in passenger transport rose: Sea and coastal transport by 14.6% and inland transport by 17.4% on 2009.

Turnover: Turnover amounted to €21.5 billion for sea and coastal passenger transport, €82.3 billion for sea and coastal freight transport, €1.95 billion for inland passenger transport, €2.6 billion for inland freight water transport and €2.8 billion for Renting and leasing of transport equipment. Inland freight transport and Renting and leasing of transport equipment both saw turnover drop compared to 2009 (6.2% and 19.4% respectively). These losses were counterbalanced by significant increases in sea and coastal passenger (20.9%), sea and coastal freight (8.9%) and inland passenger water transport (39.9%).

Gross value added: Most of the value added is generated by sea and coastal freight transport (50%), followed by sea and coastal passenger transport (35%), renting of equipment (7%) and then inland transport — passenger (4%) and freight (4%) (Figure 43). The increase in GVA since 2009 was again mostly in passenger transportation, sea and coastal transport (up 36.8%) and inland transport (up 52.4%).

Gross profit: Broadly in line with GVA, profit is mainly generated by sea and coastal freight transportation (44%), followed by sea and coastal passenger transport (37%), renting of equipment (12%) and then inland transport — passenger (3%) and freight (4%). Gross profit increased compared to 2009 in passenger transport, with sea and coastal transport up 78.2%, inland transport

up 94.1%. Sea and coastal freight transport fell by 34.5%, inland freight transportation by 31.5% and renting of equipment by 18.8%.

Gross investment in tangible goods⁴⁹: Gross investment amounted to €10.2 billion in 2017, a 40.6% plunge compared to 2009. Sea and coastal freight transportation received the most investment (61.4%), followed by sea and coastal passenger transport (21.4%) and renting of equipment (13%). Inland transport — passenger received only 1.4% and freight 3% of the total invested. All sub-sectors saw investments fall substantially compared to 2009.

Italy leads in terms of employment, accounting for 22% of the total Maritime transport jobs, but is third in terms of GVA (at 15%). Germany accounted for 21% of the sector's GVA, followed by Denmark at 16%.

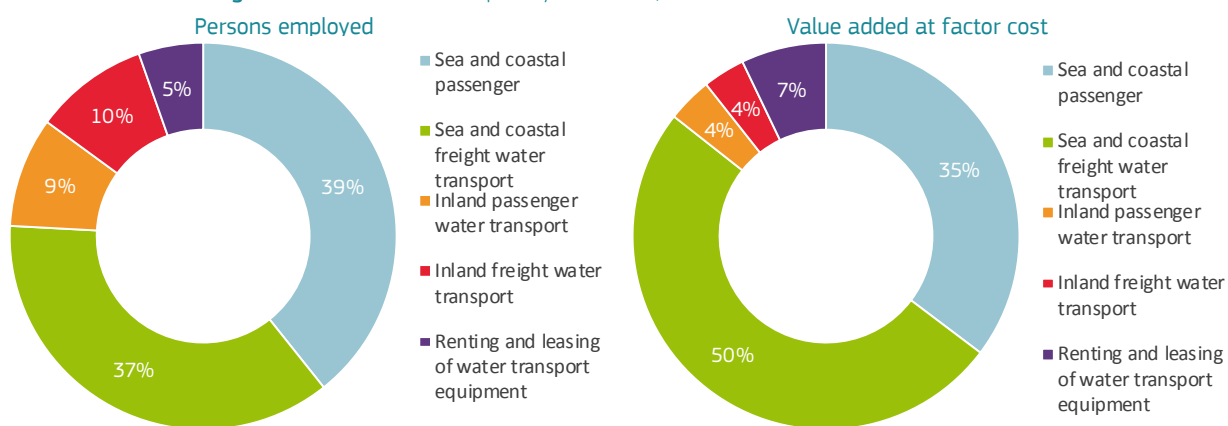
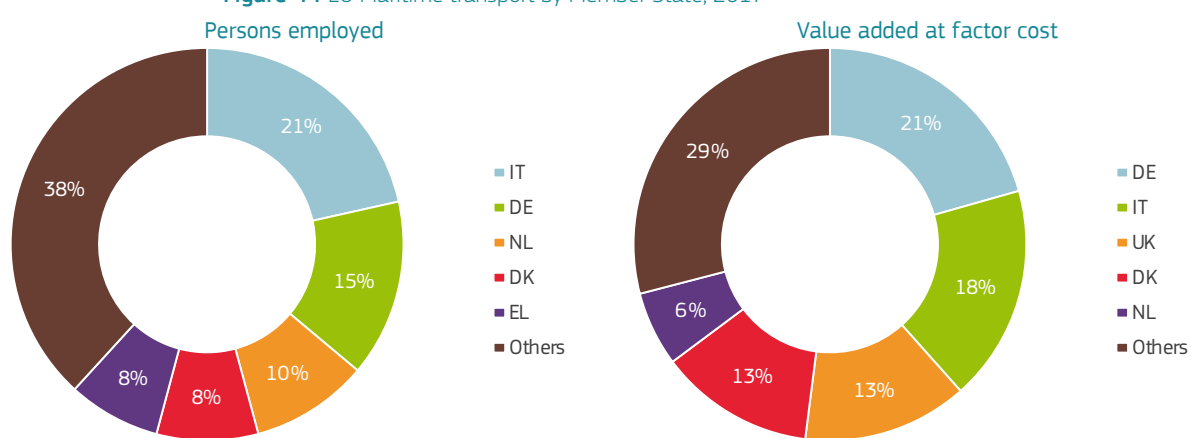
Trends and drivers

Main developments in the Maritime transport in recent years are related to the continuous increase in ship sizes for all segments (e.g. tankers and container carriers, but also cruises). This increase in the ship sizes, which aims to lower costs by reaping economies of scale, has been possible thanks to technological improvements. These new forms of maritime transport have significantly affected the Shipbuilding and Ports sectors, as well as their surrounding infrastructures (e.g. road and rail connections).

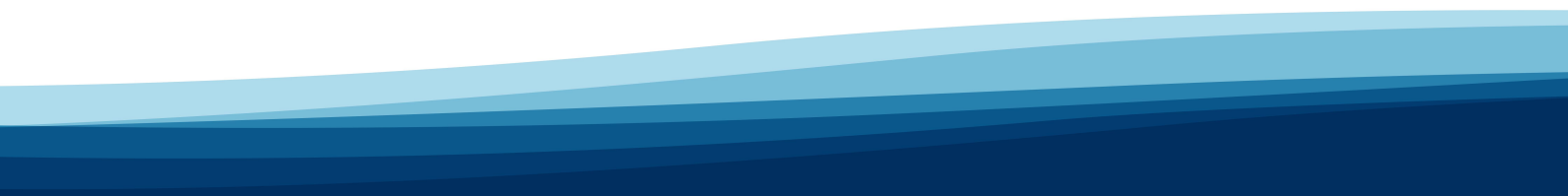
Interaction with other sectors

Maritime transport requires of ports and their infrastructure to operate. Transport companies have an interest in optimising their routes, which may compete in space with other activities such as fishing, offshore energy, aquaculture of marine protected areas.

49. Net investment in tangible goods unavailable for the sector

Figure 43 EU Maritime transport by sub-sector, 2017**Figure 44** EU Maritime transport by Member State, 2017

CHAPTER 4: **EMERGING SECTORS**



This chapter seeks to analyse the emerging and innovative sectors in the Blue Economy. Gradually, more data is becoming available so that an attempt is being made to find comparable and consistent ways of monitoring and measuring these sectors. Available data already shows some interesting trends and clear potential. In the absence of economic indicators such as those used for the established sectors, alternative indicators such as output and production capacity, number of licences, etc. have been used.

After addressing blue energy (including both offshore wind energy and ocean energy), the chapter presents the Blue bio economy, Marine minerals, Desalination and Maritime defence.

Offshore wind is the most well established of the emerging and innovative sectors and for which more reliable and accurate data are available. Onshore wind farms have been around for a number of years and are a booming industry. Offshore wind energy seems to be headed in the same direction. Employment in the sector continues to grow significantly and is estimated at 183,000 in 2017 and 210,000 for 2018. The offshore wind sector has outgrown its onshore counterpart and currently accounts for 51% of all wind energy employment.

The various forms of **Ocean energy**, such as wave and tidal energy, continue to develop and data available show that employment in the sector is at 2,250 people and cumulative investments of €3.5 billion in R&D over the last 14 years. Although the ocean energy sector is costly to invest in, an increased commitment to it can be observed.

The emerging activities of the **Blue bio economy**, such as biotechnology and biofuels, have various applications be it pharmaceutical, agricultural, industrial, energy related, etc. Although a very fragmented sector, an attempt has been made to explain and compile available information and data. This section displays the most recent social and economic data for the sector and draws particular attention to macro- and micro- algae, a sector that currently employs over 17,000 people (direct and indirect activities), with an estimated turnover of €1.5 billion (direct).

The strategic importance of raw materials is part of the EU long-term strategy. The interest in seabed **Marine minerals** exploration has fluctuated depending on market conditions (e.g. metal price hikes). Additionally, costs are estimated to be very high and the potential environmental impact is unknown and needs further framing. Moreover, international legislation for the extraction of minerals in international waters is still under discussion. Only few companies have made significant advances in mapping the seabed and testing technology (including robotics). In

the future, marine minerals could contribute in ensuring future supply of raw materials, when appropriate technology is developed and environmental-friendly practices can ensure a limited environmental impact.

Another sector with great potential is **Desalination**. Aside from highlighting the current status and trends in the sector, this section presents the investment outlook for the main Member States (ES, IT, CY). Although still emerging, this may prove to be a key sector, given that some countries and cities are already experiencing water shortages.

The **Maritime defence** sector although not emerging as such, has been categorised so because extensive comparable data is unavailable and because it is often disregarded when analysing and evaluating the Blue Economy. The figures for EU Defence show the extent of its impact on the Blue Economy: EU maritime forces personnel were estimated at almost 180,000 in 2017. In addition, 78,000 FTEs are estimated to work in naval shipbuilding.

4.1. BLUE ENERGY

The Marine renewable energy sector comprises different technologies at a different stage of development. Bottom-fixed offshore wind represents the most advanced technology, with a cumulative capacity of 18.5 GW at the end of 2018. Other technologies such as floating offshore wind, tidal and wave energy technologies are all emerging in comparison to offshore wind.

The UK is the Member State with the largest installed capacity of offshore wind energy (44%) followed by Germany (34%), Denmark (7%), Belgium (6.4%) and the Netherlands (6%). Europe's offshore wind industry keeps on leading the sector driven by a strong home market in 11 countries. European offshore wind represents about 91 % of the worldwide capacity deployed⁵¹.

4.1.1. OFFSHORE WIND

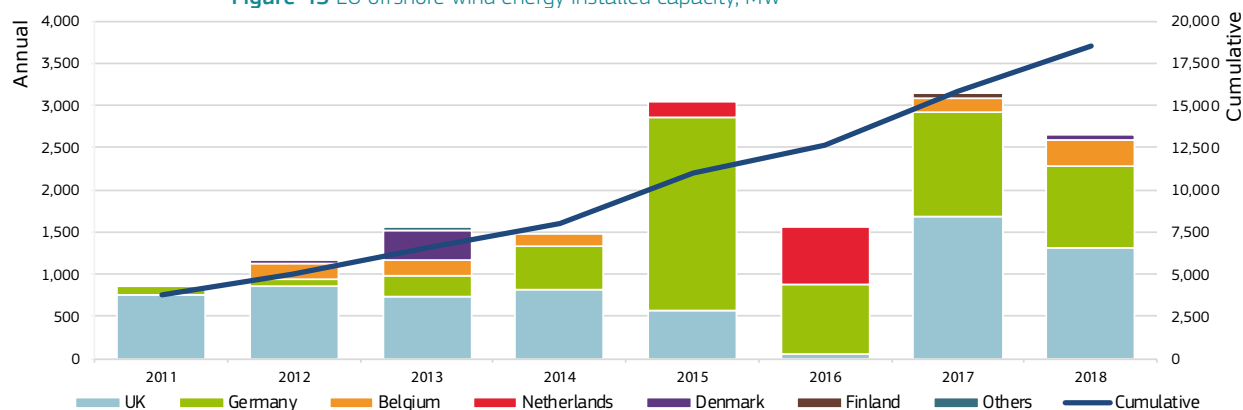
Starting with a small number of demonstration plants, the EU offshore wind energy has grown to a capacity of 18.5 GW by the end of 2018 (Figure 45)⁵⁰, with an increase of 2.65 GW in the last year. According to EIB figures, it is estimated that about 10 million European households are served by offshore wind energy, with an estimated consumption per household of 5,000 KW hours a year.

Offshore wind energy is gaining importance with respect to onshore wind energy: in 2016 new offshore wind capacity represented 11.5% of the new wind capacity installed reaching 23% of the new wind capacity in 2018. Offshore wind represents about 10% of the total installed wind energy capacity in the EU, growing from 8% in 2016. It represents over one third of the wind energy capacity installed in the UK and Belgium (Figure 46).

50. Wind Europe (2019): Offshore Wind in Europe. Key trends and statistics 2018.

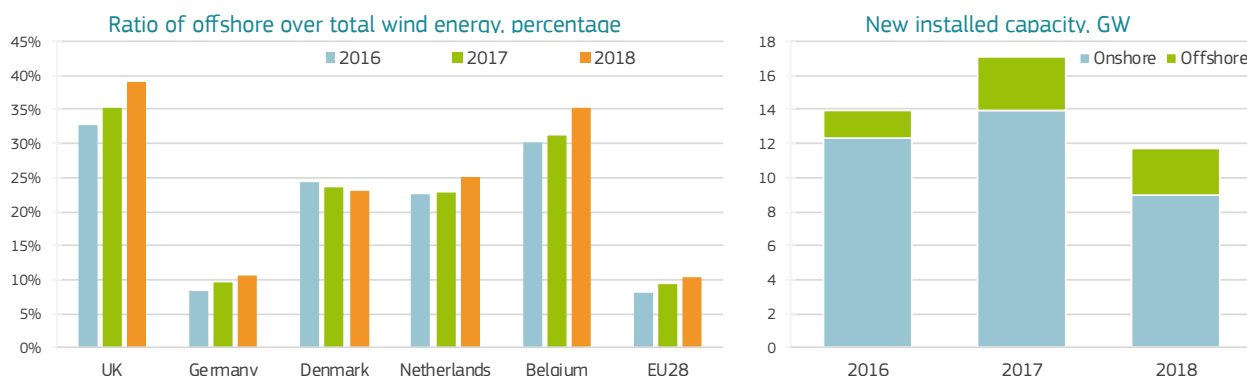
51. JRC (2019). Technology Development Report LCEO: Wind Energy. Upcoming

Figure 45 EU offshore wind energy installed capacity, MW



Note: Other Member States include Sweden, France, Spain, Ireland and Portugal.
Source: WindEurope, JRC

Figure 46 Onshore vs. offshore wind energy in the EU



Source: EurObserver'ER (2018) WindEurope (2017), JRC

Figure 47 Location of EU offshore wind farms (polygons)

Source: European Commission (European Atlas of the Seas).

The total capital investment needed to deploy the 18.5 GW capacity installed since 2011 is estimated to amount to €67 billion. This results in an average capital expenditure of around €3.6 million per MW the total capital investment needed to develop the additional 2018 capacity is estimated to amount to €9.6 billion. In this context, the EIB has played a crucial role in supporting the financing of offshore wind the EU (see Section 6.6).

In 2018, 11 new offshore wind projects reached final investment decision for a total capacity of 4.24 GW and an investment of about €10.3 billion. This represents an increase in capacity commissioned compared to 2017 (3 GW and €11 billion of investment) but a decrease with respect to the projects announced in 2016 (5.2 GW and €21.6 billion investment). In 2016, offshore wind energy projects accounted for 56 % of the total EU wind energy finance deals closed; and, in 2017, 47% of the inward wind energy investment⁵². In 2018, the average cost per MW has decreased to ERU 2.43 million per MW. Such as decrease in asset finance needed for new offshore wind energy projects is an indicator of the reducing cost of the technology.

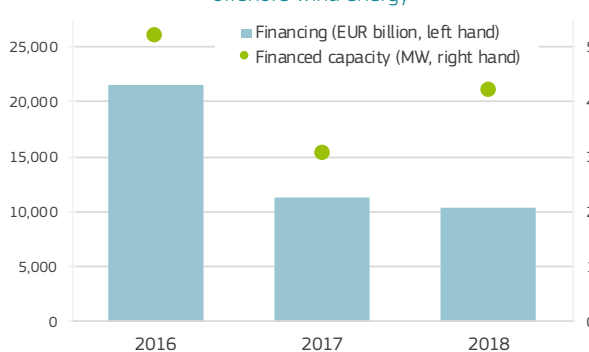
The continuous growth of the offshore wind energy sector is having a significant impact in terms of

job creation. Direct employment associated to offshore wind energy doubled between 2013 and 2016, with the sector creating and estimated 11 jobs per MW installed between 2011 and 2016. Assuming a similar rate for 2017 and 2018, the total employment associated to offshore wind is estimated at 183,000 jobs for 2017 and 210,000 jobs for 2018 (Figure 49). In 2017, the offshore wind sector represented 51% of the total wind energy employment.

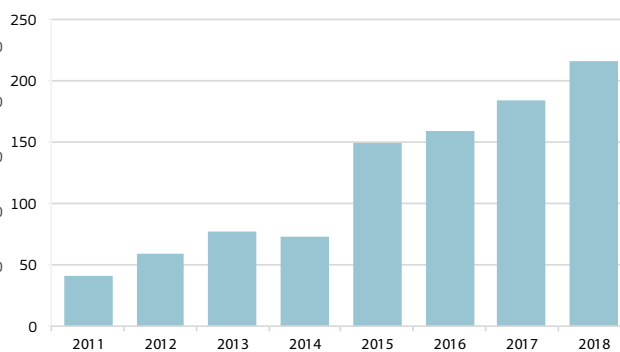
A significant share of offshore wind energy related employed is related to the manufacturing of turbines, blades, towers and other components. As reported by IRENA, a 500 MW offshore wind farm is associated with the creation of 8,000 FTEs through its lifetime, (indicatively 16 jobs per MW). 60% of which are for manufacturing. While 24 % of the direct jobs generated by offshore wind are associated with Operation and Maintenance (O&M) and can be expected to last for the lifetime of the farm (Figure 50).

In the short to medium term, a further growth of the offshore wind energy sector is foreseen, driven by the significant reduction in cost of offshore wind technologies and by decarbonisation policies and the implementation of the National Energy and Climate Plans. Forecasts developed by the JRC-

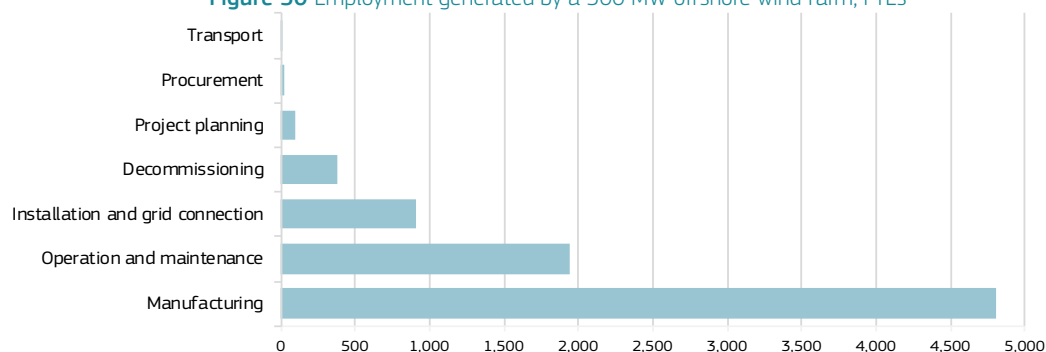
52. EUobserv'ER (2018). The state of renewable energies in Europe. 2018.

Figure 48 Announced financing and capacity to be installed, EU offshore wind energy

Notes: Data based on the finance deals closed each year.
Capacity might be added in the respective year or in the following years.
Source: EurObserver'ER (2016 and 2017) and WindEurope (2018)

Figure 49 EU Jobs and offshore wind energy

Source: WindEurope and JRC analysis

Figure 50 Employment generated by a 500 MW offshore wind farm, FTEs

Source: IRENA.

Table 7 Floating offshore wind projects in the EU

Project	Capacity	Location	Year
Equinor	30 MW	UK	2017
Windfloat	27 MW	PT	2019
Demonstration farms	4 x 24 MW	FR	Early 2020s
FloCan5	25MW	ES	2021
Balea	26 MW	ES	2020
Nautilus	5 MW	ES	2020
Gaelectic	30 MW	IE	2021
SeaTwirl S2	1 MW	SE	2020

Source: JRC; NER300 and WindEurope.

EU-TIMES indicate that sustained decarbonisation policies could drive the annual deployment rate of offshore wind energy from the average of 2.5 GW/year in 2011–2018 to 12.5–20 GW/year in 2045 depending on different modelled CO₂ reductions.

Floating offshore wind is a growing sector that is strengthening Europe's leadership in renewable energy. Nearly 80% of the available offshore wind in Europe is located in waters that are at least 60 meters deep, where it is too expensive to fix structures to the bottom of the sea. Fortunately, it is possible to build floating platforms that work almost anywhere on the sea. These are cheaper to run and install, more environmentally friendly to sea life, and have greater output. The development of floating offshore wind technologies will lower costs in the sector and increase output, leading to a significant drop in the cost of energy for floating offshore wind projects. Currently only 30 MW of floating wind capacity are operational however a further 210 MW are planned to be deployed between 2019 and 2021 (Table 7).

4.1.2. OCEAN ENERGY

The ocean energy sector (tidal and wave power) is still relatively small compared to the offshore wind energy sector. At the end of 2018, the total global ocean energy installed capacity was 55.8 MW, with most of it located in EU waters (38.9 MW)⁵³. The EU is the global leader with 58 % of the number of tidal energy technology developers and 61% of the wave energy developers based in the EU⁵⁴.

The development of ocean energy technologies is still primarily at R&D. The majority of it has been financed by private contribution although in the last years, but national and EU public funding has significantly increased in the last few years (Figure 51). Between 2003 and 2017, total R&D expenditure on ocean energy amounted to a cumulative €3.5 billion with the majority of it (€2.8 billion) coming from private sources⁵⁵. We observed an increased interest in ocean energy from 2008 onwards.

National public expenditure in R&D has been growing slowly since 2011, stabilising at €56 million a year in 2014 and 2015, accounting for more than 15% of total R&D expenditure in ocean energy. The European Union supports different activities addressing the development of ocean

energy technologies. Between 2007 and 2018, the EU has supported ocean energy projects for a total of €440 million, with additional €148 million committed for 2019 under NER 300. Taking into account the co-financing required from participants, the total funds mobilised amount to some €900 million. EU funds have also given a renewed focus on R&D on ocean energy with an increase from €60 million allocated in the 7th Framework Programme (2007-2013) to €140 million allocated under Horizon 2020 (2014 – 2020).

The continuous development of the ocean energy technologies and the ongoing improvements are expected to lead to a significant increase of the deployed ocean energy capacity in the near future. A pipeline of about 5 GW of projects has been announced for up to 2030 (Figure 52). Under the assumption of capital costs to develop ocean energy similar to the current ones for offshore wind, the expected investment needs are estimated at over €18 billion.

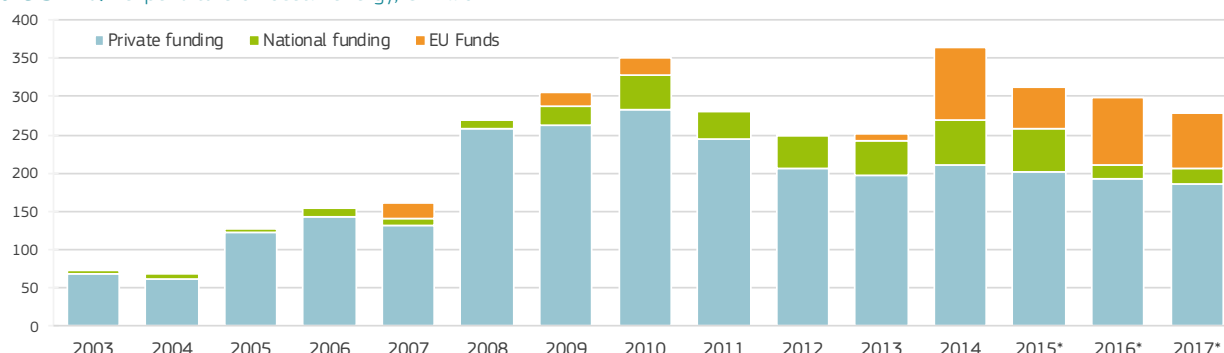
As the market for ocean energy technologies is shaping, over 430 companies in the EU are involved in different stage of the ocean energy supply chain, with an estimate of 2,250 jobs created in the ocean energy sector across Europe (Figure 53).

53. 26.2 MW of tidal stream, 12.7 MW for wave energy – Ocean Energy Europe – annual report to be published soon.

54. JRC (2019). Technology Development Report LCEO: Ocean Energy. Upcoming

55. Private investments are estimated from the patent data available through Patstat. Sources: Fiorini, A., Georgakaki, A., Pasimeni, F. and Tzimas, E., (2017) Monitoring R&D in Low-Carbon Energy Technologies, JRC105642, € 28446 EN and Pasimeni, F., Fiorini, A. and Georgakaki, A., (2018) Patent-based Estimation Procedure of Private R&D: The Case of Climate Change and Mitigation Technologies in Europe. SPRU Working Paper Series (SWPS).

Figure 51 R&D expenditure on ocean energy, € million



Notes: Data for 2015, 2016 and 2017 are estimates.

Source: International Energy Agency, European Patent Office and own calculations.

Figure 52 EU ocean energy projects, MW



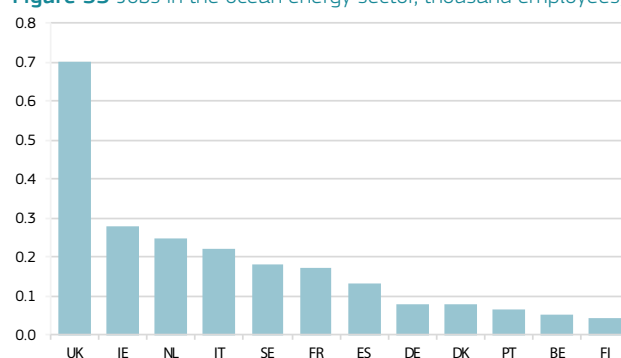
Source: JRC

R&D activity in ocean energy involves over 674 EU companies in 25 Member States. These companies have taken an active role in R&D and have either filed patents or have been involved in the developed activity related to ocean energy. 50% of the inventions patented in the EU are for wave energy technology, 45% for tidal energy, 3% on Oscillating Water Column (OWC), and 2% for Ocean Thermal Energy Conversion (OTEC). When countries outside of the EU are accounted, wave energy share increases to 56%, tidal energy decreases to 37%, OWC drops to 2%, OTEC raises to 4% and Salinity gradient to 1%. EU developers are protecting their inventions in all the potential key ocean energy markets outside of the EU, such as the US, China, Japan and Korea (Figure

54). On the other hand, only a small share of non-European developers is seeking protection in Europe.

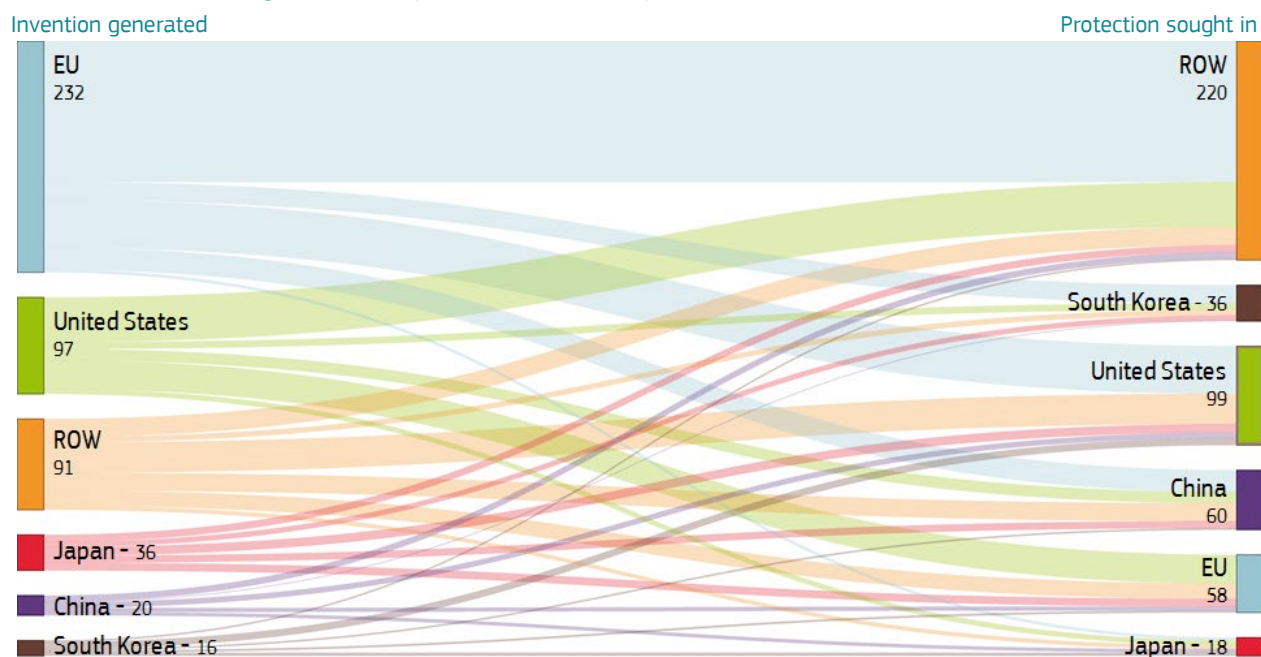
The EU is leader in the filing of patents in international markets, seeking protection in all key markets such as the United States, South Korea, and China as well as in Canada and Australia (included in ROW). Nevertheless, the EU receives only a small number of incoming patents applications from outside, primarily from the United States (Figure 54). The patent filings indicate that European is a net exporter of ocean energy technology innovation and that European ocean energy developers are well positioned to exploit the growth of the sector globally.

Figure 53 Jobs in the ocean energy sector, thousand employees, 2016



Source: JRC, Innosea

Figure 54 Global patents flow, number of patents



Notes: Intra-market patents are not included.
Source: JRC

4.2. BLUE BIO ECONOMY

Bio economy is highly related to the extraction of living resources and includes sectors relying on renewable aquatic biological resources such as fish, algae, and other macro- and micro-organisms to produce food, feed, pharmaceuticals, cosmetics, bio-based products, and energy.

Biological resources are increasingly being used in new ways, creating a new biotechnology sector. New activities explore and exploit aquatic organisms to develop new products and services. Most of them use living organisms as either a source or a target of biotechnology applications, producing smart food, feed, biofuels, biomaterials, cosmetics, pharmaceuticals, nutraceuticals, industrial enzymes, solutions for bioremediation, etc. This sector has a potential to contribute to EU economic growth and to provide new jobs, while also supporting sustainable development, public health, and environmental protection.

The main applications of biotechnology in the EU economy fall into four broad groups:

- In **healthcare and pharmaceutical applications**, biotechnology has led to the discovery and development of advanced medicines, therapies, diagnostics, and vaccines.
- In **agriculture, livestock, veterinary products, and aquaculture**, biotechnology has improved animal feed, produced vaccines for livestock and is improving diagnostics for detecting diseases. Biotechnology is also being used as food, food ingredients and human nutrition; fishmeal, hydrocolloids and other algae extracts are used in nutritional supplements, thickening or gelling agents, food dyes, etc.

- In **industrial processes and manufacturing**, biotechnology has led to the use of enzymes in the production of detergents, pulp and paper, textiles, and biomass, improving the process efficiency and decreasing energy and water consumption as well as toxic waste.
- In **energy production**, using macro and micro-algae technology a theoretical volume of 20,000-80,000 litres of biofuel per hectare per year can be produced⁵⁶.

Data provided by the industry claims that the EU algae biomass sector currently employs 17,000 people (in both direct and indirect activities). Turnover was estimated at €1.5 billion, with an additional €240 million in indirect activities (e.g. research)⁵⁷. The sector also has a total of over 560 companies and more than 300 research groups in the EU.

The algae sector

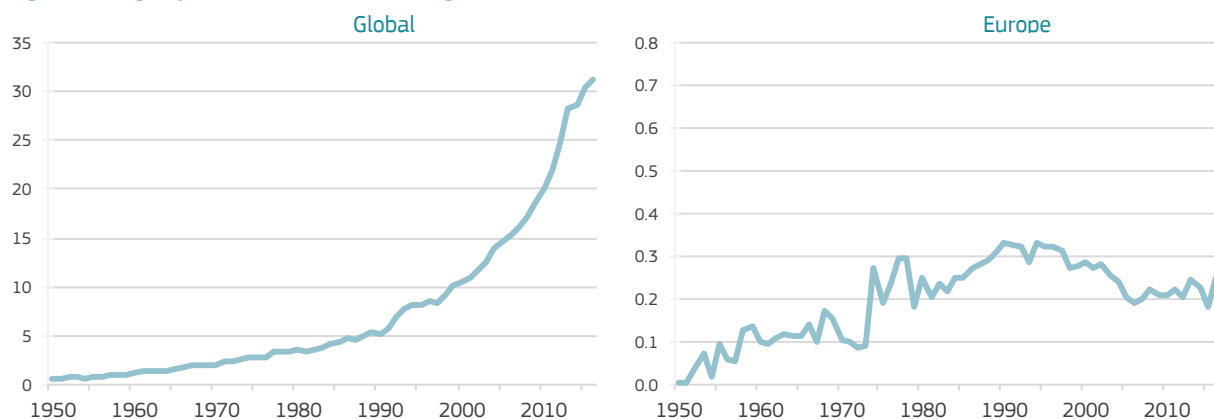
Algae play an important ecological role in coastal ecosystems. Additionally, the economic importance of these resources in the bio-based economy has increased. In the last decades there has been a growing demand for algae biomass for a variety of high-value commercial products (e.g. cosmetics, nutraceuticals, pharmaceuticals) and new bio-based applications (biomaterials and energy), in addition to the traditional uses of this biomass source (food and food applications, feed, fertilisers).

Worldwide, algae production has markedly increased over the last two decades from an amount of 10.5 Mt (wet weight) in 2000 to 31.2 Mt in 2016 (Figure 55), with an estimated market

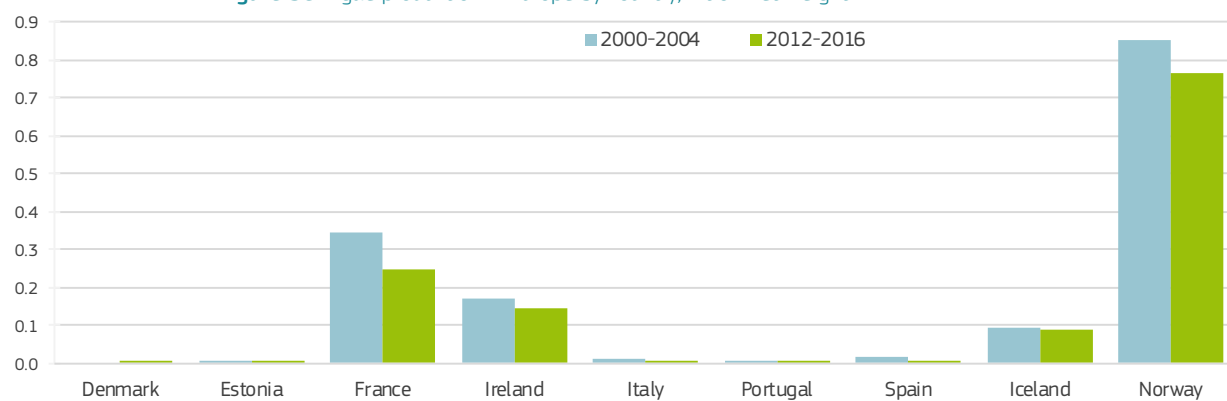
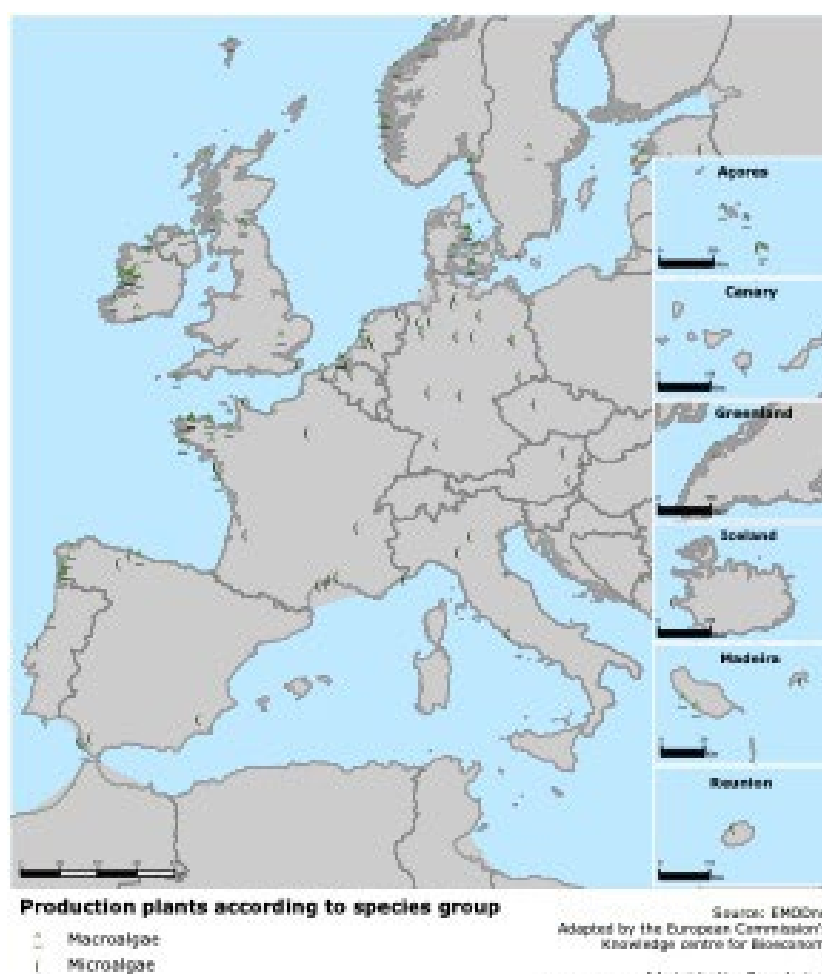
56. According to European Science Foundation Marine Board (2010), quoted by the OECD report.

57. Camia A., Robert N., Jonsson R., Pilli R., García-Condado S., López-Lozano R., van der Velde M., Ronzon T., Gurria P., M'Barek R., Tamosiunas S., Fiore G., Araujo R., Hoepffner N., Marelli L., Giuntoli J., Biomass production, supply, uses and flows in the European Union. First results from an integrated assessment, € 28993 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-77237-5, doi:10.2760/539520, JRC109869

Figure 55 Algae production, Mt of wet weight.



Source: Camia et al. (2018)⁵⁷

Figure 56 Algae production in Europe by country, Mt of wet weightSource FAO⁵⁷.**Figure 57** EU algae production plants, 2019

Source EMODnet.

value of \$1,073 million⁵⁸. China, producing 47% of the total algae biomass in 2016, is the main algae biomass supplier at the global level. In Europe, the production has been stable over time with the EU contributing to 0.2% and the EEA contributing to 0.8% of the global production. Norway, France and Ireland are the main European producers of algae biomass (Figure 56).

However, official statistics underestimate actual production, as according to EMODnet Human Activities, most Member States do not report their production of (micro) algae.

In the EU, there is an approximately equal share of macro and microalgae producers (Figure 57). France is the Member State with more companies, followed by Spain, Ireland and Germany. In some Member States, production is dominated by either microalgae (e.g. Germany or Italy), or macro algae (e.g. Ireland, Denmark, and Norway).

For macro algae, harvesting is still the dominant production method but aquaculture facilities represent already 22% of the production units. The amount of biomass produced by aquaculture is however, still very small. Offshore aquaculture is already operational in some countries with companies in the UK, France, Spain and Denmark. The main production method for microalgae biomass is the use of photobioreactors.

The upscaling of the algae production in Europe is dependent on the overcoming of several constraints at the market, regulatory and technological levels. Several ongoing European projects addressing these limitations are working on the valorisation of the production chain and extraction of high added value products by developing the biorefinery approach. Some examples of these initiatives include the following projects BIOSEA, ABACUS, MACROCASCADE, MAGNIFICENT, VALUEMAG, MACROFUELS, GENIALG and the Blue Baltic Biotechnology Alliance.

Blue Bio economy projects in the European Union

Bio-Based Industries Joint Undertaking (BBI JU) is a Public-Private Partnership between the European Commission and the Bio-based Industries Consortium, supporting Research & Innovation (R&I) actions for Bioeconomy in Horizon 2020. BBI JU has a total budget of €3.7 billion to implement its Strategic Innovation and Research Agenda (SIRA).

The increasing dynamic of the Blue Bioeconomy sector and the huge potential of aquatic biomass in biotechnology applications are reflected in the revised version of SIRA in 2017, where marine/aquatic sources were highlighted as targeted BBI JU feedstocks. In particular, micro- and macroalgae (seaweeds) are a great source of aquatic biomass with a broad spectrum of applications, while requiring little or no arable land, hence not competing with agriculture and the food industry.

The scientific and economic outputs of BBI JU in blue biotechnology can be measured through the reported data of the seven running projects that use aquatic biomass as their main source of feedstock. Six of these projects are Research and Innovation Actions (RIA) at low Technology Readiness Level (TRL) working towards achieving pilot scale of TRL 4-5, and one is an Innovation Action (DEMO), aiming at Demonstration scale of TRL 7. Basic information about the projects is listed in Table 8. BBI JU aquatic biomass projects. Most of the projects are still in their initial phase of implementation, and more concrete results should be expected in the coming years. At the same time, the BBI JU project portfolio may further expand, since Call 2018 had the RIA topic and Call 2019 has the DEMO topic.

Table 8 Bio-Based Industries Joint Undertaking aquatic biomass projects

Project	Topic	Type	Feedstock	Total Cost (€ million)	Timeframe
MACRO CASCADE	Valorisation of aquatic biomass	RIA	Macroalgae	4.32	2016-2020
ABACUS	Exploiting algae and other aquatic biomass for production of molecules for pharma, nutraceuticals, food additives and cosmetic applications	RIA	Microalgae	5.12	2017-2020
BIOSEA			Microalgae and macroalgae	4.50	2017-2020
MAGNIFICENT			Microalgae	5.89	2017-2021
VALUEMAG			Microalgae	4.80	2017-2020
AQUABIOPRO-FIT	Proteins and other bioactive ingredients from side streams and residues	RIA	Aquaculture and fisheries by-products	4.16	2018-2022
SpiralG	Integrated multi-valorisation of algae into advanced materials and high added-value additives	DEMO	Microalgae	5.61	2018-2022

Source: own elaboration (CORDA database)

Figure 58 Funding and beneficiaries of Bio-Based Industries Joint Undertakings, 2014-2017

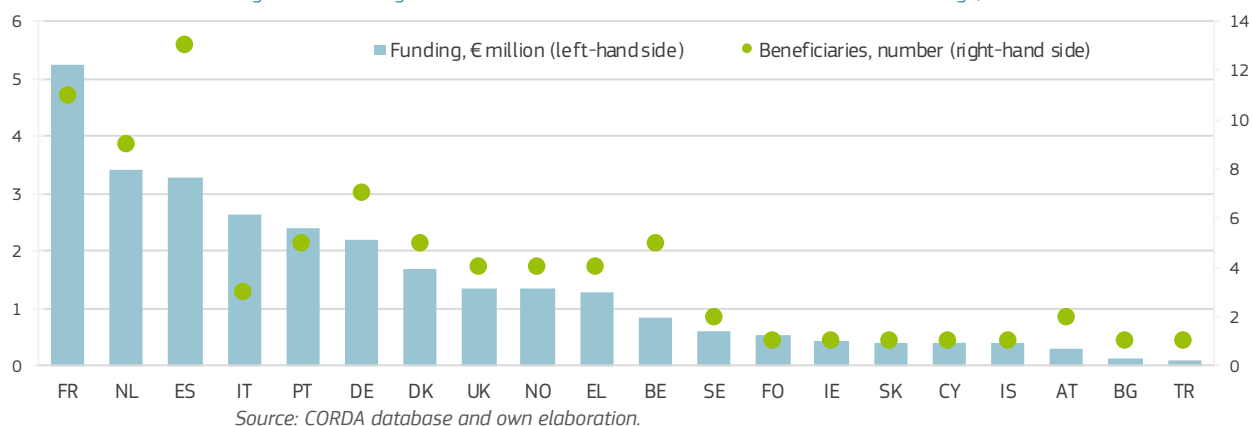
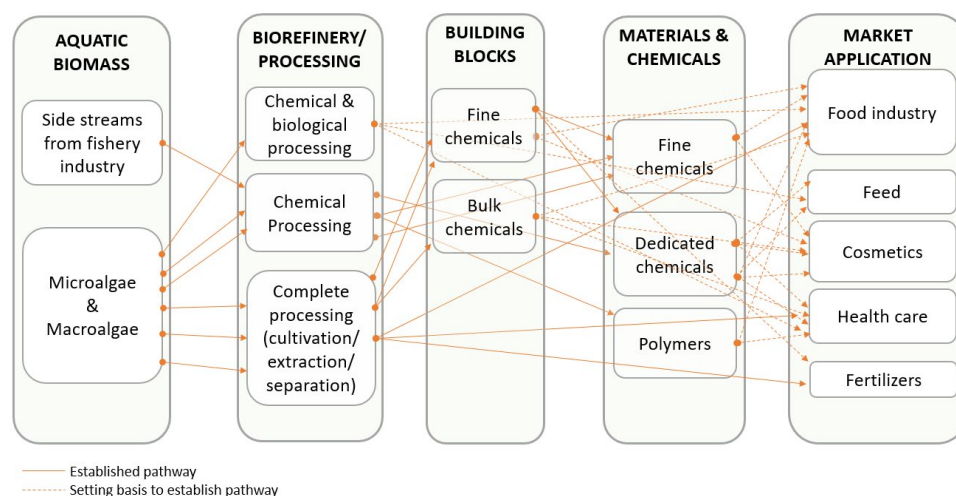


Figure 59 Value chain analysis of BBI JU aquatic biomass projects with cross-sector interconnections



Source: CORDA database and own elaboration.

The seven running projects have a cumulative total budget of the projects €34.4 million, with an EU contribution of 28.9 million in the Calls 2014-2017. There are 85 beneficiaries in total. These beneficiaries are established in 20 EU and associated countries in Horizon 2020. The number of beneficiaries per country and the amount of BBI JU allocated per country are shown in Figure 58. Number and funding of BBI JU beneficiaries per country. Additionally, beneficiaries in Cyprus, Iceland and Faroe Islands participate in aquatic biomass BBI JU projects, demonstrating the importance of Blue Bioeconomy for island communities and the growth in coastal areas.

Small and medium-sized enterprises (SMEs) are the backbone of the European economy and the drivers of growth and innovation. The total BBI JU funding allocated to SMEs reaches 35%, while for aquatic biomass projects it exceeds 50%, confirming that Blue Bioeconomy is a dynamic and emerging sector. The highest number of these SMEs contribute to the optimisation of biorefinery

processing (45%); 5 SMEs are biomass suppliers; 7 contribute to the development of innovative bio-based products; and 10 aim at accelerating the market uptake for the developed products.

The indicative cross-sector interconnections from feedstock to market applications are illustrated above, and based on expected results of the BBI JU aquatic biomass projects until 2020. Due to the high cost of production and harvesting of microalgae, most of the applications aim at high value products, such as cosmetics and health care products.

Available data for employment refers only to direct jobs in the projects (excludes indirect employment), and amounted to 289 employees.

BOX 3 BLUE BIOTECHNOLOGY: A BRIEF OVERVIEW

There is no single, official definition of blue biotechnology or marine biotechnology. In 2013 and 2014, workshops and questionnaires were conducted to reach an agreement on a common understanding of these terms⁶¹. The European Commission has highlighted the importance of consensus regarding these definitions for the development of new initiatives and policy options.

Marine biotechnology: Efforts that involve marine bio-resources, as either the source or the target of biotechnology applications⁶²

Blue biotechnology: biotechnology (or biotechnological applications) requiring bio-resources collected from the marine environment⁶³

The main applications of biotechnology in the EU economy fall into four broad groups:

Healthcare and pharmaceutical: an example is the MarPipe, a research and training network of 11 academic and industrial partners based in 8 European countries, are working in collaboration to train young researchers in the field of marine drug discovery. This project is funded by Marie Skłodowska-Curie Actions in Horizon 2020⁶⁴.

Agriculture, livestock, veterinary products, and aquaculture

Industrial processes and manufacturing

Energy production

Employment: due to the broad nature of blue biotechnology, it is difficult to determine the economic value and employment that this sector creates. Based on the stakeholder database developed by ECORYS⁶⁵, total employment is thought to be between 11,500 – 40,000 people. These are usually high-end jobs and are the result of substantial public investment in education and training.

Investment: ECORYS⁶⁶ found that financing is a major issue for small and medium-sized enterprises (SMEs) involved in blue biotechnology. Typically, an investment company will have only one marine-orientated/ -involved company in its portfolio. Therefore, in the absence of easy access to investment, publicly funded research collaborations are usually part of a funding model and SMEs may work in collaboration with researchers at universities or institutes and with larger industrial companies. Universities and research organisations are frequently involved in the stages from bioprospecting to identification and characterization, but may also be involved in industrial adaptation, often as part of contract funding by industry or publicly funded, industry-facing consortia. As a result of the cash-limitations associated with SMEs, plus the limited power they have to bring blue biotechnology products to market, they require downstream linkages to end-users to whom they can sell or license their innovations, products and processes or who may become their exits through trade sale, and to investors who can help them survive longer while they validate and de-risk their developments. The difficulty for SMEs in maintaining momentum through the value chain when blue biotechnology is being applied to biomedical and industrial applications has been recognised by CIESM. As an innovative policy initiative, The Mediterranean Science Commission (CIESM) advocates linking SMEs with biotechnology associations, venture capitals, financing bodies and other stakeholders who can help them tackle financial challenges and constraints⁶⁷.

61. OECD, (2016). Marine Biotechnology: Definitions, Infrastructures and Directions for Innovation. Working Party on Biotechnology, Nanotechnology and Converging Technologies.

62. Marine Board (2010). Marine Biotechnology: A New Vision and Strategy for Europe - <http://www.marinebiotech.eu/sites/marinebiotech.eu/files/public/library/MBT%20publications/2010%20ESF%20Position%20Paper.pdf>

63. Collins, J., Broggiato, A. and Vanagt, T (2018). Blue Biotechnology, River Publishers Series in Renewable Energy https://www.riverpublishers.com/dissertations_

64. Details can be found in: <http://www.marpipe.eu.xml/9788793609259/9788793609259.xml#ch02b4>; ECORYS, (2014). Study in support of Impact Assessment work on Blue Biotechnology, FWC MARE/2012706 – SC C1/2013/03

65. ECORYS, (2014). Study in support of Impact Assessment work on Blue Biotechnology, FWC MARE/2012706 – SC C1/2013/03

66. ECORYS, (2014). Study in support of Impact Assessment work on Blue Biotechnology, FWC MARE/2012706 – SC C1/2013/03

67. Briand F (Ed.) (2011). New Partnerships for Blue Biotechnology Development: innovative solutions from the sea. Proceedings of the CIESM International Workshop, Monaco, 11–12 Nov 2010. http://www.ciesm.org/WK_BIOTECH_REPORT_2010.pdf - Google Scholar

4.3. MARINE MINERALS

Marine mining refers to the extraction and processing of non-living resources in the ocean, including **marine aggregates** (e.g. sand and gravel), other **minerals and metals in/on the seabed** (e.g. manganese, tin, copper, zinc and cobalt) and **chemical elements dissolved in seawater** (e.g. salt and potassium). Marine aggregates, as a long established activity, are discussed in Section 3.3. This section focuses on the minerals and metals in/on the seabed⁶⁸.

In 2008, the Raw Material Initiative⁶⁹ established a strategy for access to raw materials. In general, securing reliable and undistorted access to raw materials from sustainable sources has increasingly become an important factor for the EU's competitiveness and, hence, crucial to the success of the growth strategy. Recently, the raw materials policy reinforced in the context of the EU Industrial Policy Strategy⁷⁰, positions raw materials as key elements for the industrial value chains. A good example of this new approach is the Staff working document "Report on Raw Materials for Battery Applications"⁷¹, developed in the context of the Strategic Action Plan on Batteries⁷². The strategic importance of raw materials is also part of the 2050 long-term strategy⁷³: "Raw materials are indispensable enablers for carbon-neutral solutions in all sectors of the economy. Given the scale of fast growing material demand, primary raw materials will continue to provide a large part of the demand".

The EU is highly dependent on imports of metallic minerals, as its domestic production is limited to about 3% of world production⁷⁴. Moreover, the EU is highly reliant on "high-tech" metals imports such as cobalt, platinum, rare earths, and titanium. Though often only needed in very small quantities, these metals are increasingly essential to the development of technologically sophisticated products in view of their growing number of functionalities. In this context, the Commission has identified a list of critical raw materials⁷⁵ with high supply-risk, high economic importance and lack of substitutes for which reliable and unhindered access is a concern to European industry and sustainable value chains.

The EU will not master the general shift towards sustainable production and environmentally friendly products without such high tech metals. These metals play a critical role in the development of innovative "environmental technologies" for boosting energy efficiency and reducing greenhouse gas emissions. Similarly, batteries are a key enabling technology for low emission mobility and for energy storage⁷⁶. According to IET InnoEnergy, forecasts indicate that the demand for batteries will grow exponentially in the coming years.

Marine minerals could be a future supply to the rapidly growing demand of raw materials including certain metals, rare earth elements (REEs) and other minerals, when extracted with environmentally friendly practices. Marine aggregates, minerals and chemicals dissolved in seawater have been extracted for centuries. However, the extraction of minerals and metals in and on the seabed has several challenges to face, including the mapping of reserves, developing appropriate technology and reducing the potential environmental impact.

The potential of minerals and metals on the seabed

There are four main classes of mineral deposits at different water depths: phosphorites (95-1,950 metres), cobalt-rich ferromanganese crusts (800-2,400 metres), polymetallic sulphides (400-3,700 metres) and polymetallic nodules (4,000-6,000 metres). Conventional dredging has a theoretical depth limit of 150 metres; however, dredging deeper than 80 metres requires a high degree of innovation of the equipment and a significant amount of energy⁷⁷. The technical, economic, financial and environmental challenges to be solved multiply when the exploitation of minerals and metals has to be performed at a depth of up to 6,000 metres. Therefore, marine mining activities at great depth remain on a preliminary exploratory stage in both European and international waters. In addition, maerl beds (containing calcium, magnesium and other nutrient minerals) have been extracted for use as agricultural fertiliser by several Member States (including France at rates of up to 500,000t/ year).

Since 2001, the International Seabed Authority (ISA) has signed 34 (15-year) contracts for exploration for polymetallic nodules, polymetallic sulphides and cobalt-rich ferromanganese crusts in the seabed of areas beyond national jurisdiction (ABNJ). Despite the low number of licences, the area of 1.9 million square kilometres in question is rather large⁷⁸. Exploration licences have been allocated to eight explorative areas and spread across the Atlantic, Pacific and Indian Oceans. Among the EU Member States, Belgium, France, Germany, the United Kingdom, Bulgaria, the Czechia, Poland and Slovakia have sponsored licences in the Atlantic Ocean (Mid-Atlantic Ridge), the Indian Ocean and Pacific Ocean (Clarion-Clipperton Fracture Zone)⁷⁹.

At this point in time, no commercial deep seabed-mining project in ABNJ and pan-European Seas by EU Member States exists. In this context,

68. The analysis of the extraction of salt and other chemicals dissolved in seawater is left for future editions of this Report.

69. COM(2008) 0699 final - The raw materials initiative - Meeting our critical needs for growth and jobs in Europe.

70. COM(2017) 479 final - Investing in a smart, innovative and sustainable Industry A renewed EU Industrial Policy Strategy.

71. SWD(2018) 245/2 final - Report on Raw Materials for Battery Applications.

72. COM(2018) 293 final - Strategic Action Plan on Batteries.

73. COM(2018) 773 final - A Clean Planet for all - A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy.

74. Commission Staff Working document accompanying the Communication on The raw materials initiative (Annex 2, Table 2), SEC(2008) 2741 and World Mining Data.

75. COM(2017) 490 final.

76. European Commission: Report on Raw Materials for Battery Applications, SWD(2018) 245/2 final.

77. See Rozemeijer et al. (2018): Seabed Mining in Building Industries at Sea: 'Blue Growth' and the New Maritime Economy, River Publishers.

78. This is equivalent to over 40% of the overall surface of the EU or the combined surface of France, Spain, Germany, Poland and the United Kingdom.

79. International Seabed Authority <https://www.isa.org/jm/contractors/reserved-areas>

recent articles published in international scientific journals argue that biodiversity loss from deep-sea mining is likely to be inevitable and irrevocable, and that most likely permanent. This sentiment has gained some political traction. The European Parliament adopted a resolution on international oceans governance in January 2018, calling for a moratorium on deep-sea mining until the risks to the environment are fully understood. This call was repeated by the UN Envoy on Oceans at the recent World Economic Forum meeting in Davos⁸⁰.

As a follow up of EMODnet Geology, the project MINDeSEA: Seabed Mineral Deposits in European Seas: Metallogeny and Geological Potential for Strategic and Critical Raw Materials aims at exploring and investigating seafloor mineral deposits. It addresses an integrative metallogenetic study of principal types of seabed mineral resources in the European Seas⁸¹. MINDeSEA has identified the occurrences of cobalt- and lithium-rich ferromanganese deposits in pan-European seas, which are crucial for low-carbon energy production and new technologies

(Table 9 and Figure 60). However, additional investigation and exploration would be necessary to estimate reserves for all these marine deposits in Europe.

Most marine reserves concentrate in Spanish and Portuguese waters, followed by waters belonging to Sweden, Estonia, Italy, Finland and Latvia (Table 10).

The interest in seabed exploration has fluctuated depending on market conditions (e.g. metal price hikes). In fact, only a few companies have made significant advances in the mapping of their area and in testing technology, including robotics for the deep-sea.

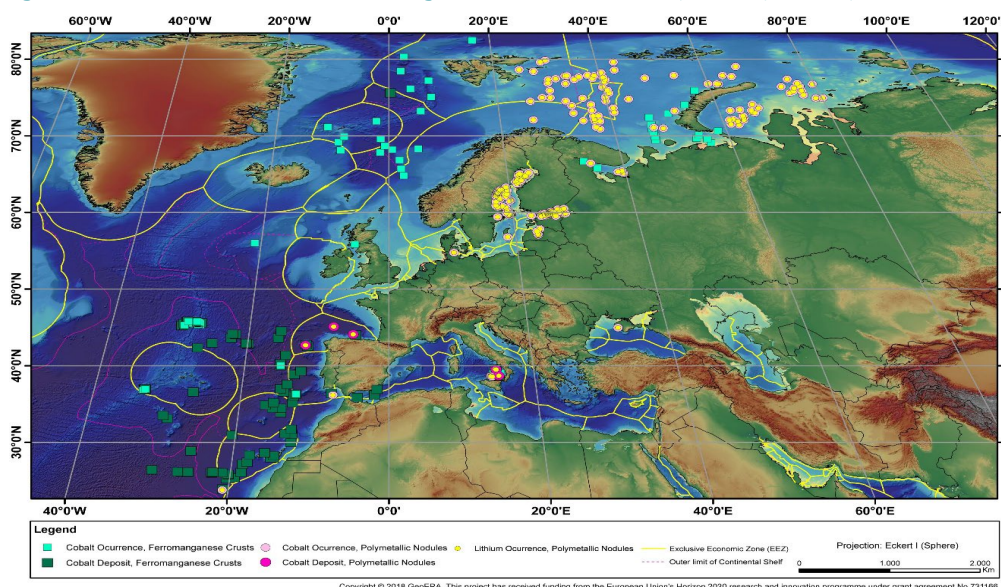
Besides the exploration licences granted since 2001, the ISA is expected to finalise the 'Mining Code' a comprehensive set of rules, regulations and procedures that will also consider the exploitation of marine mineral resources in international seabed areas. This should provide the framework necessary to go beyond the current prospecting and exploration stages and should be

Table 9 Cobalt- and lithium-rich ferromanganese occurrences and/or deposits in pan-European seas (crusts and nodules)

Marine region	Cobalt	Lithium
Arctic ocean	114	90
Baltic sea	113	113
Black sea	1	1
Bay of Biscay and the Iberian coasts	13	4
Celtic sea	1	
Micronesia	87	1
North East Atlantic Ocean	16	
Norwegian Sea	13	
Western Mediterranean Sea	21	6
Total	379	215

Source: GeoERA-MINDeSEA.

Figure 60 Cobalt- and lithium-rich ferromanganese occurrences and deposits in pan-European seas



Source: GeoERA-MINDeSEA.

80. Gianni, M. and Owen, S. (2019): *The perils of mining the deep*, World Ocean Initiative (www.woi.economist.com).

81. For more information: <http://geoera.eu/projects/mindesea/>

Table 10 Occurrences and deposits of marine minerals and metals by Member State

Member State	Ferrom Crust Deposits		Polymetallic Nodule Dep.		Phosphorite Deposits		Placer Dep.	Polymetallic Sulphides		Evaporites	Aggregates
	EEZ	ECS	EEZ	ECS	EEZ	ECS	EEZ	EEZ	ECS	EEZ	EEZ
Belgium											1
Denmark		1									1,017
Estonia			31								5
Finland			7								7
France											153
Germany			1								367
Ireland		1									22
Italy	12		6								
Latvia			4				7				56
Netherlands											4
Poland							2				18
Portugal	27	43	1		19	1		18	2		24
Spain	23	4	3	1	5	1	8	3		9	284
Sweden			59								10
UK	1										5
Total EU	63	49	112	1	24	2	17	21	2	9	1,973
p.m. other European countries											
Albania							16				26
Iceland	1							109	2		5
Norway	14	5	17	9							3,247
Russia	16		67	8							46
Ukraine			1								25

Notes: EEZ: Exclusive Economic Zone; ECS: Extended Continental Shelf.

Source: GeoERA-MINDeSEA.

ready in 2020. The aim is to provide the necessary measures to ensure the effective protection of the marine environment from harmful effects, which may arise from mining activities. This withstanding, further research and knowledge of the deep-sea environment, ecosystem structure and resilience are required. The scale and potential severity of mining-impacts requires innovation and environmentally friendly technology that could limit the generation of plumes and other adverse environmental impacts during mining as well as developing adjusted policies⁸². The European Union has financed a series of studies and projects aimed at increasing knowledge on deep-sea marine resources and ecosystems, gaining a better understanding of its potential environmental impacts and how to mitigate them:

- MIDAS: Managing Impact of Deep-Sea Resources Exploitation, 2013-2016, €9 million.
- Blue Mining: Breakthrough Solutions for the Sustainable Exploration and Extraction of Deep Sea Mineral Resources, 2014-2018, €10 million.

- VAMOS: Viable Alternative Mine Operating System, 2015-2018, €9 million.
- Blue Nodules: Breakthrough Solutions for the Sustainable Harvesting and Processing of Deep Sea Polymetallic Nodules, 2016-2020, €8 million.
- ROBUST: Robotic Subsea Exploration Technologies, 2015-2020, €6 million.

Additionally, the Joint Programming Initiative Healthy and Productive Seas and Oceans (JPI Oceans) has funded the MiningImpact projects (1 and 2): Ecological aspects of seabed mining, 2013-2022, €22.9 million.

Although the industry players active in the field are generally confident, the future of seabed mining at great depths remains uncertain; in particular regarding the extent to which the seabed will be tapped of its resources on a commercial scale. Since the costs are known to be very high, and while the benefits are still unclear, the actual commercial activities of extraction of minerals have not yet commenced, and projects have been repeatedly delayed⁸³.

82. See Gjerde et al. (2016). Implications of MIDAS results for policy makers: recommendations for future regulations. 46pp and Ketels et al. (2017). Priority Sector Report: Blue Growth. European Cluster Observatory. 16pp.

83. European MSP Platform. Technical Study: MSP as a tool to support Blue Growth. Sector Fiche: Marine aggregates and Marine Mining. Final version: 16/02/2018 (and references therein). /www.msp-platform.eu.

4.4. DESALINATION

4.4.1. DESALINATION IN THE EU

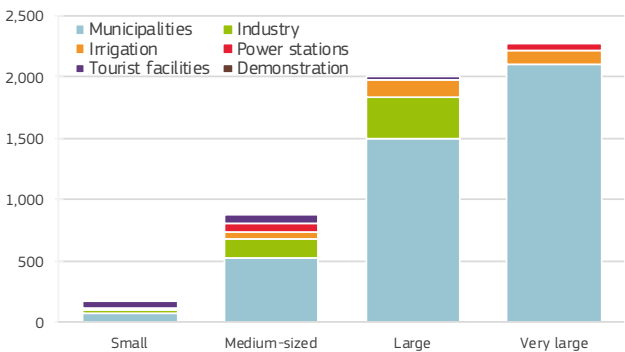
Desalination is a common technology and an alternative for water supply that can alleviate the growing pressure on freshwater resources. Currently, it is used to overcome water shortages in areas where water resources are limited. However, it involves energy-intensive processes and therefore it is one of the sectors where adaptation to increasing freshwater scarcity may entail trade-offs, in the long term, as regards emission reduction objectives and pollution (brine as a side product of desalination).

In Europe there are a total of 2 352 desalination plants producing a total of 9.5 million cubic meters

per day (m³/day) of fresh water from seawater and brackish water, representing approximately 4.2% of total water employed in the EU public water supply sector.

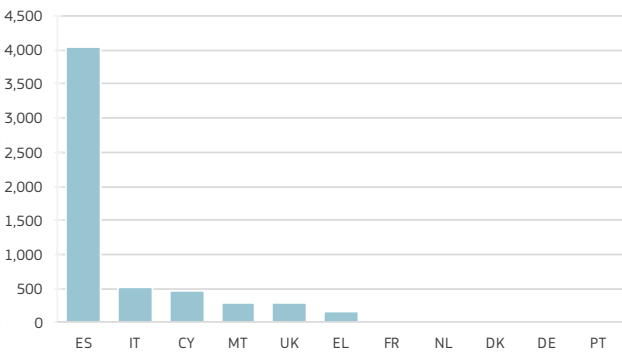
Although only 8% of the existing EU desalination plants have a very large (capacity of over 50,000 m³/day) or large (capacity of 10,000–50,000 m³/day), they contribute to 69% (6.6 million m³/day) of the existing total installed desalination capacity (Figure 61). 33.6% of EU plants have a medium size (capacity of 1,000–10,000 m³/day) and 58% are small (capacity below 1,000 m³/day).

Figure 61 EU desalination capacity by use and size, thousand m³/day



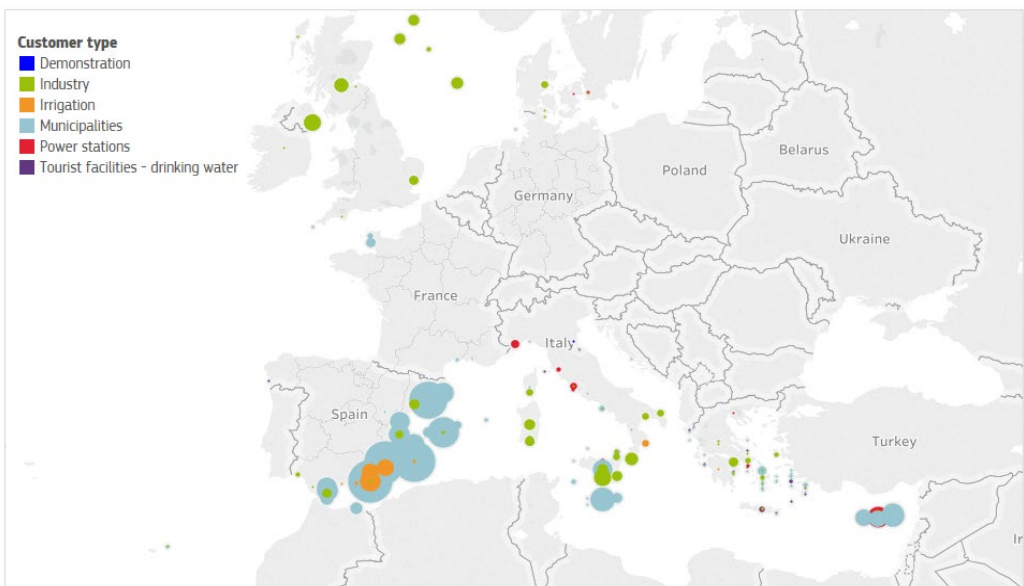
Source: Desaldata.

Figure 62 EU desalination capacity by Member State, thousand m³/day



Source: Desaldata.

Figure 63 Location of EU desalination facilities



Source: Desaldata.

84. Note that the focus lies on coastal desalination facilities. There are also several inland facilities, which were excluded for geographical reason (they use brackish water)

Figure 64 Investment in the development (EPC) of new EU desalination plants, € million

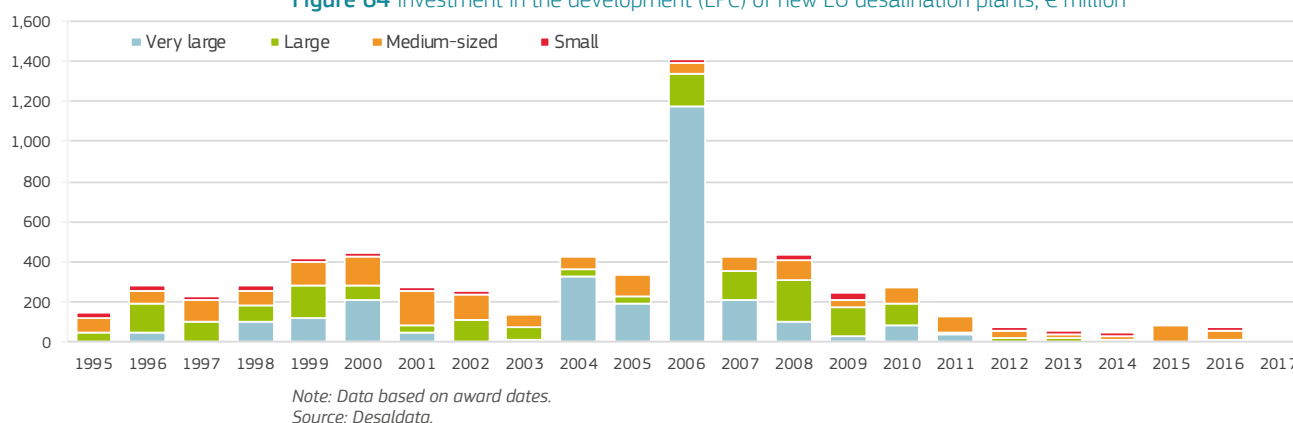
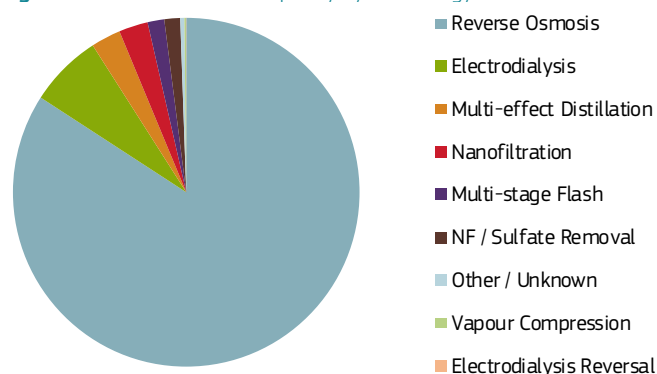


Figure 65 EU desalination capacity by technology used



Some 79% of the fresh water produced is used for public water supply (4.2 million m³/day), 10% is used for industrial applications, 2.7% in power plants, and 6% for irrigation (Figure 61). Depending on the type of plant, different uses of the desalinated water are applied. Whilst the majority of desalination plants serve municipalities in terms of public water supply, a considerable amount of medium and small desalination plants are used to provide water to tourist facilities.

68% of the EU desalination capacity is located in Spain (4.2 million m³/day), with the remaining being located mainly in Mediterranean countries: Italy (9%), Cyprus (8%), Malta (5%) and Greece (3%)¹. There are some desalination plants also in Northern countries like the UK, the Netherlands, Denmark and Germany, mainly for use in the oil and gas sector (Figure 62 and Figure 63).

Since the year 2000, there has been a clear increase in the construction of larger capacity plants, which deliver an increasingly greater portion of the fresh water supply of coastal (and insular) cities in the EU, particularly in Spanish cities such as Barcelona, Alicante and Las Palmas.

Since the 1950s, the development of desalination plants in the EU has required over €9.6 billion of investment in engineering, procurement and construction (EPC), of which €6.5 billion € have been invested since 1995 (Figure 64), for a capacity of 7.8 million m³/day built since 1995. 33% of investments have been directed to extra-large plants, 29% to large plants, 30% to medium-sized plants and 8% to small plants.

In the EU, 84% of the operating desalination plants employ Reverse Osmosis technologies, with the remaining 16% spread across a number of different technologies such as Electrodialysis, Multi-effect Distillation and Nanofiltration (Figure 65).

Capital and operational costs associated with desalination plants depends on a number of factors, from the total capacity of the plant, to the type of desalination technology employed and the salinity of the water to be desalted. The costs of the plant determine the price of water that is passed to the public.

Table 11 Cost associated with desalination

Technology	Capital cost		Operation and management cost		Water production	
	€ million / 1 000 m ³ a day		€ / m ³		€ / m ³	
	Range	Average	Range	Average	Range	Average
MSF	1.5-2.7	1.8	0.19-0.27	0.23	0.91-1.53	1.27
Reverse Osmosis	0.7-2	1.1	0.22-0.65	0.31	0.56-1.43	0.86

Note: the cost of water production depends on the capacity of the plant and the lifetime of the project.

Source: International Water Association, Almar Water Solution (2016), JRC Analysis.

Reverse Osmosis technologies are associated with lower capital and operational costs compared to thermal desalination technologies such as Multistage Flash and Multi-effect distillation. Energy is a significant cost-component for desalination. Energy needs vary according to the type of technologies (pressurised system such RO versus thermal system such as MSF), to the salinity of the source water and the level of purity of the desalted water required at the end of the treatment. In general MSF systems requires roughly 83-84 kWh/m³ of energy (80.6 kWh/m³ for heat, and 2-3.5 kWh/m³ of electricity); while large scale RO systems require 3-5 kWh/m³ for saline water and 0.5-2.6 kWh/m³ for brackish water.

On average, producing one cubic meter (1000 l) of desalted water using reverse osmosis technology costs €0.86. This means that the daily cost of supplying 7.6 million m³ of desalted water in the EU with RO is €6.5 million, or €2.38 billion a year. The total cost of desalination in the EU is estimated at €2.67 billion € a year when all technologies are considered. Taking into account that the production value of the EU28 Water collection treatment and supply sector (e.g. public water supply) was of €73 billion in 2017⁸⁵, the desalination sector is estimated to account for 3.7% of the water supply sector value.

Employment

There is limited information available on the number of jobs generated by desalination plants. Estimates provided by Cetaqua⁸⁶ suggest that the labour cost of one m³ of water is 0.04 €. Based on this information it can be derived that personnel costs in the EU desalination sector amount to €132 million. Taking into account the average personnel cost reported by Eurostat⁸⁷ of €34,800, it follows that the desalination sector employs around 3,800 people for operation excluding construction and R&D.

Based on this assumption, extra-large and large size desalination plants would require staff of about 40 FTEs, which is in line with employment in similar scale facilities as reported in Australia⁸⁸.

Industrial Leadership

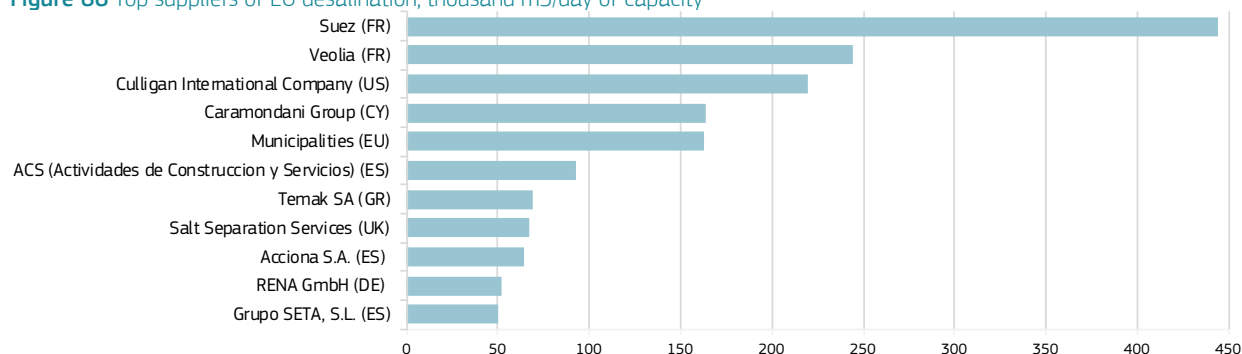
Most of the EU desalination plants employ EU technology and EU developers (Figure 66). EU desalination suppliers also play a significant role in exporting their expertise beyond the EU; however, this is not considered as part of their contribution to the EU Blue Economy.

85. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Water_supply_sewerage_waste_management_and_remediation_statistics_-_NACE_Rev_2

86. Cetaqua: *The Economics of Desalination for Various Uses* (<http://www.races.ficheros/doc/00731.pdf>).

87. [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:T2bSectoral_analysis_of_key_indicators_Water_supply_sewerage_waste_management_and_remediation_activities_\(NACE_Section_E\)_EU-28_2015.png](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:T2bSectoral_analysis_of_key_indicators_Water_supply_sewerage_waste_management_and_remediation_activities_(NACE_Section_E)_EU-28_2015.png)

88. <https://www.water.vic.gov.au/water-grid-and-markets/victorian-desalination-project/desalination-project-overview/the-desalination-plant>

Figure 66 Top suppliers of EU desalination, thousand m³/day of capacity

Source: Desaldata.

4.4.2. DESALINATION OUTLOOK

The market for desalination in Europe is expected to grow in the next few years. In 2016, desalination facilities have been commissioned in the EU, predominantly in Spain, Italy and Cyprus, for a total additional capacity of 500,000 m³/d and an investment of €457 million (Figure 65). 96% of the new contracted desalination capacity is expected to employ reverse osmosis. 70% of the new capacity is for large or very large desalination plants. The average capital expenditure associated with new capacity is of €1.1 million for each 1,000 m³/d of additional capacity.

Aside of the 90,000 m³/d, additional capacity in desalination plants have been announced without specifying a date of entry in operation⁸⁹. Investments are estimated at €99 million.

The future growth of the desalination market is tied to the need to identify viable solutions to the tackle the increasing water scarcity and its

translation into policy. Freshwater availability is expected to be impacted by climate change many regions in Europe are expected to face severe water scarcity by 2050⁹⁰. Forecast of Water Exploitation Index for 2050, indicated that the coastal Mediterranean regions and also regions in France, Germany, Hungary, Northern Italy, Romania and Bulgaria may face critical levels of water scarcity⁹¹, with Water Exploitation Index exceeding 0.2 (Figure 69).

Desalination may provide a viable solution to alleviate water scarcity in many European regions. However, increased desalination capacity may be met with significant trade-offs in terms of energy requirements, carbon emission and environmental impacts. Desalination is an energy intensive technology, and while it currently provides 4.2% of the EU water for public supply, it accounts for 16% of the energy used by the EU water system⁹². The International Energy Agency has estimated that, at global level, the energy consumption of desalination is expected to increase eight-fold by 2040 due to increased demands for freshwater produced by desalination.

Figure 67 Desalination plants outlook in the EU

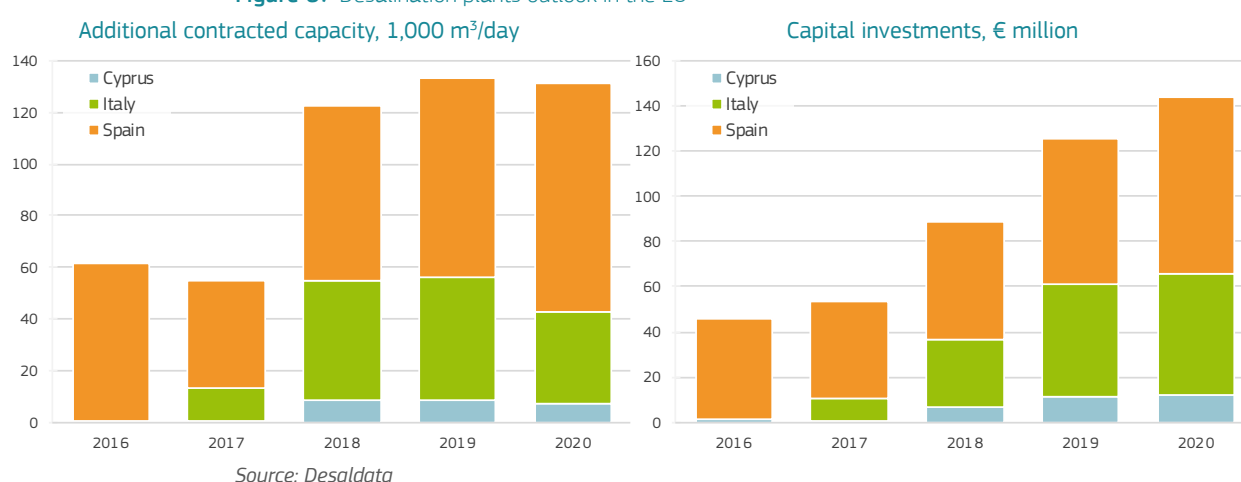
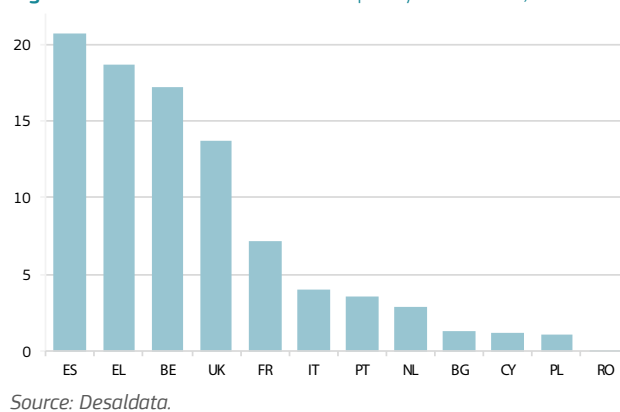


Figure 68 Additional desalination capacity announced, 1 000 m³/day



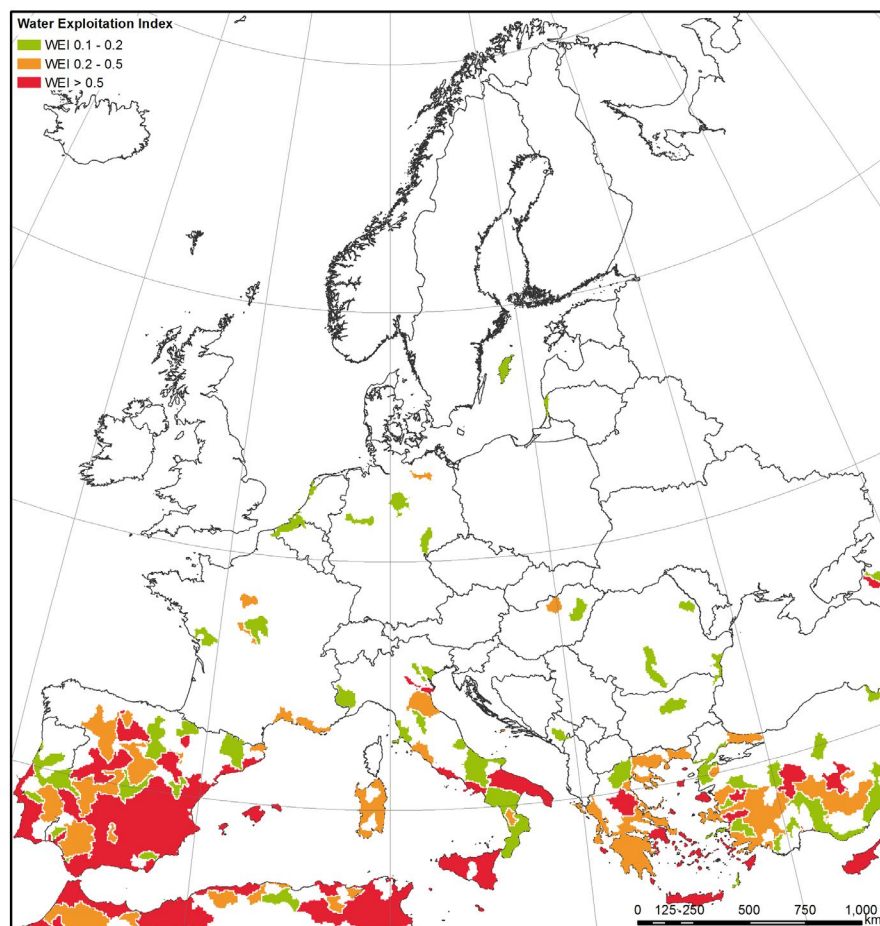
89. IDA (2019) Water Security Handbook 2018-2019

90. Bisselink et al (2018) Impact of a changing climate, land use, and water usage on Europe's water resources: A model simulation study. Available at: <https://ec.europa.eu/jrc/en/publication/impact-changing-climate-land-use-and-water-usage-europe-s-water-resources-model-simulation-study>

91. JRC (2019) Water – Energy Nexus in Europe. Upcoming

92. JRC (2019) Water – Energy Nexus in Europe. Upcoming

Figure 69 Mapping of Water Exploitation Index for 2050



Notes: The Water Exploitation Index is defined as annual total fresh water abstraction as a percentage of the long-term annual average available water from renewable fresh water resources.
Source: Bisselink et al (2018).

Most of the new desalination demand is expected to take place in the Middle East and Northern African regions. However, if demand increases with a similar ratio in the EU, desalination capacity could be estimated to reach 76.4 million m³/d, equal to 150 litres of water per person per day⁹³. The investments necessary to meet the new desalination capacity (66.8 million m³/d) are expected to be in the order of €73.5 billion with current technology and costs.

These numbers however are expected to represent the ceiling of investments in desalination technology. Due to the energy requirements and environmental impacts related to desalination technologies, other technologies may be employed to reduce the its demand, in particular water reuse and smart leakage reductions combined with a reduction of the use of water per capita from the current 245 litres per person per day⁹⁴.

In order to overcome the energy requirements of desalination and to provide drinking water to large amount of citizens, renewable energy driven desalination plants have been investigated⁹⁵, in particular by developing mega scale desalination (See Box 4).

93. Based on current EU Population of 508 million citizens.
Source: Eurostat.

94. JRC (2019) Water – Energy Nexus in Europe. Upcoming

95. Pistocchi et al. (2018) – Hydro-economic assessment of the potential of PV-RO desalinated seawater supply in the Mediterranean region: Modelling concept and analysis of water transport costs. Luxembourg

BOX 4 MEGA-SCALE DESALINATION

The vision of sustainable mega-scale desalination (i.e. meeting the demand of several millions of people) is a system of production of drinking water (1) using as little energy as possible, and 100% renewable; (2) with minimum production of waste; and (3) with maximum positive outfalls of the water made available.

Thanks to energy recovery devices and improved performance of membranes, seawater desalination through reverse osmosis (RO) may require 2-4 kWh per m³ of water produced. In principle, all this energy could come from renewable energy sources (RES). However, the intermittency of RES may require energy storage in batteries and/or water reservoirs. With RO, each m³ of freshwater produces about 1 m³ of brine. This has a residual content of energy (in principle recoverable through, for instance, forward osmosis) and a relatively high concentration of minerals (including Lithium in the order of 0.2 ppm, among others) needed in several industrial processes, although energy and minerals recovery today still represents a very tough challenge. Brine can be further concentrated, producing water and vapour which may be eventually used for greenhouse crops, for instance. Recovering resources from brine could reduce in principle to zero the volume of waste brine to be disposed to the marine environment. Desalinated water may be supplied to cities and human activities, but its quality may not be appropriate for all uses. In particular, its mineral content may not be sufficient for the dietary requirements of humans, and may require integration. Wastewater from desalinated urban waters may be used for agricultural irrigation after appropriate treatment, but its quality may not be tolerated by agricultural soils (e.g. due to high boron content), requiring additional finishing.

Implementing renewable energy desalination with full resource recovery entails significant challenges of technical, financial and organizational nature. However, if these are addressed, desalination may enable access to plentiful water in otherwise uninhabitable regions, produced at a cost for the user in the order of €1 to €2 per cubic meter. The massive investments required to service 100 million people around the Mediterranean (in the order of €15 to 30 billion) may turn into a flywheel for employment and may stimulate the invention of innovative solutions. Moreover, a wise use of water may enable a significant expansion of agriculture, with additional employment and growth opportunities; and the recovery of minerals may relieve pressure on critical raw material supplies. Mega-scale desalination plants may become pivotal to the development of circular economic districts and spearhead the implementation of innovative business models. With appropriate planning, design and financing, suitable candidates for development projects may be identified, attracting investments (including international aid and other transfers) and creating opportunities, which, in turn, might contribute to relieve the migratory pressure from the South to the North of the Mediterranean.

4.5. MARITIME DEFENCE

This chapter covers two sectors under defence and security, navies and naval shipbuilding. This sector is indeed anything but new, but has been categorised as emerging not in terms of its new activities but rather on the emergence of its data, and its inclusion and consideration and a contributing activity to the Blue Economy.

4.5.1. NAVIES

By mid 2017, EU-28 navies account for at least 564 of commissioned warships with a total tonnage in the region of 1.5 million. Many rankings of world navies exist, depending on different criteria and the expertise and knowledge of compilers; however, there is general consensus in that the navies of France, the UK, Italy and Spain are among the 15 most powerful navies in the world. Furthermore, France and the UK are among the five countries in the world with a well-established submarine-launched ballistic missile (SLBM) nuclear deterrence capability⁹⁶.

According to data from the European Defence Agency (EDA), EU28 total maritime personnel was 190,432 in 2016 and 177,090 (estimated) in

2017, showing a decrease from 2006 (227,309). The largest annual decrease took place in 2011 and 2013 (-4.2% and -4.7% respectively). The maritime sector represented 13.5% of all EU military personnel in 2016 (14.14% in 2017) up from 12.4% in 2006. Additionally, out of the three branches of the armed forces, this sector suffered the least cuts in personnel.

The economic and financial crisis led to significant cuts in defence spending. New acquisitions and programmes were reduced or slowed down, and many vessels were retired earlier than expected due to funding shortages. As stated above, maritime personnel also decreased. This pattern, however, is currently changing, given the improved economic environment and renewed perceived threats from Russia⁹⁷.

Moreover, navies have adapted to new missions particularly with the proliferation of overseas missions, be they for peacekeeping or anti-piracy purposes (e.g. EU NAVFOR ATALANTA in the Horn of Africa and Indian Ocean and EU NAVFOR SOPHIA in the central Mediterranean), which require new types of vessels (e.g. Offshore Patrol Vessels, OPV).

96. France has 4 SSBN (Sub-surface ballistic nuclear) of Le Triomphant class and the UK has 4 SSBN of the Vanguard class. Both France and the UK have also nuclear-powered attack submarines (6 in the case of France and 7 the UK). World Naval Review 2018.

97. World Naval Review 2018.

98. World Naval Review 2018. editor C. Waters. Seaforth Publishing, 2017

Table 12 Personnel and main equipment of the top EU Navies

Member State	Personnel 2006	Personnel 2016	Aircraft carriers	Major amphibious vessels	SSBN	SSN	SSK	Fleet escorts	MCMV
France	41,700	35,636	1	3	4	6		18	14
UK	34,770	32,570	(2)	6	4	7		19	15
Italy	35,000	29,326	1+1	3			8	18	10
Spain	21,594	20,659		3			3	11	6
Germany	19,387	16,011					6	9	10
Greece	20,301	15,931					11	13	4
Netherlands	9,209	7,651		2			4	6	6

Notes: In France it is a carrier vessel nuclear (CVN in NATO classification). In the UK, the aircraft carriers are under construction. In Italy, one carrier vessel (CV) and one carrier vessel light (CVL). One of the Spanish amphibious vessels is a multi-purpose amphibious assault ship (LHD) – carrier vessel. France's Charles de Gaulle is equipped with Catapult Assisted Take-Off Barrier Arrested Recovery (CATOBAR) planes and helicopters. The rest, UK's Queen Elisabeth and Prince of Wales, Italy's Giuseppe Garibaldi and Cavour and Spain's Juan Carlos I are equipped with vertical/short take-off and landing planes (V/STOL) and helicopters.

SSBN: Sub-surface ballistic nuclear submarine. SSN: Nuclear powered attack submarine. SSK: Attack submarine. Fleet escorts include multipurpose destroyers (DDG) and frigates (FFG). MCMV: Mine countermeasures vessel.

Sources: EDA Defence Data 2005-2017 for military personnel. World Naval review 2018⁹⁸ for fleet strengths (data for mid-2017).

4.5.2. NAVAL SHIPBUILDING

99. The majority of the information of this chapter comes from the “Study on Industrial and technological Competences in the Naval Sector” (September 2016), financed by the European Defence Agency.

100. The study highlighted that countries considered source from 60 to 80% of the purchased value within national borders and that over 95% of the materials, components and systems that make up naval vessels are sourced within Europe, with no dependency from non EU countries for critical items.

101. Shipyards and Maritime Equipment Association (Sea Europe). Out of a total income of €91 billion for the entire shipbuilding industry.

102. Formally DCNS. According to Le Marin (22/2/2019), Naval Group is the largest naval shipbuilder and obtained a revenue of €3.6 billion in 2018, a gross profit of €265.9 million and a net profit of €178.2 million. Its order backlog was worth €13.8 billion, including 12 conventional submarines for Australia. Thales has a 35% stake in Naval Group.

103. The group includes also the military division of Blöhm & Voss, Howaldtswerke Deutsche Werft (HDW), the world's largest manufacturer of diesel-electric powered conventional submarines, Altk Elektronik, producer of integrated sonar systems for submarines and heavy weight torpedoes, and 25% of Hellenic Shipyards Co.

104. The largest shipbuilder in Europe. Specialised in large cruise vessels. It also owns 50% of Chantiers de l'Atlantique, the other 11.7% belongs to the Naval Group, 4% to local companies and employees and the rest to the French state. This acquisition is pending European Commission approval.

105. BAE Systems Maritime – Submarines and BAE Systems Maritime – Naval Ships.

106. Some of the most important are Thales Underwater Systems (France), a manufacturer of sonar systems for surface and submarine vessels and vessel's communication masts, the already mentioned Altk Elektronik and Indra (Spain), a manufacturer of radars, communications systems, laser designators and integrated combat systems.

107. Including Kockums AB (Sweden), owned by Saab Group. Currently working in partnership with Damen for the new generation of submarines for the Swedish and Dutch navies; Constructions Mécaniques de Normandie (France), a manufacturer of patrol vessels; Rodman (Spain), a manufacturer of fast military patrol vessels; and German Naval Yards Kiel.

According to a study on industrial and technological competences in the naval sector⁹⁹, the European naval industry has managed to design, integrate and produce the whole range of naval ships and almost the totality of its core systems and components¹⁰⁰, with specific distinctive competencies in the field of the most complex surface/combatant ships (e.g. Multi-purpose frigates and destroyers) and a world leadership in conventional submarines equipped with air-independent propulsion (AIP) systems. According to the study, the competitive position of European shipbuilding industry is expected to remain healthy in the future, especially in the market segments of higher added value and with larger sales value (e.g. submarines, destroyers and frigates).

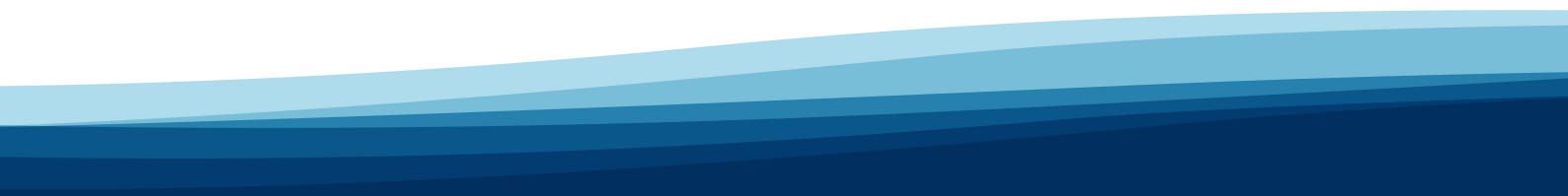
Naval shipbuilding in the EU represents an annual income of €10.8 billion in naval new buildings and of EU 4.2 billion in naval maintenance¹⁰¹. The job count can be estimated at around 78,000 FTE.

The EU sector is made of six major shipbuilding companies (“system integrators”): Naval Group (France)¹⁰², Navantia (Spain), Damen (The Netherlands), ThyssenKrupp (Germany)¹⁰³, Fincantieri (Italy)¹⁰⁴ and BAE Systems (UK)¹⁰⁵. They are “the centre of gravity of a wide network of highly specialised sub-suppliers¹⁰⁶ and collective aggregate over 98% of the \$75 billion EU naval order book at mid-2015”. There are other naval shipbuilders in other maritime EU MS¹⁰⁷, but, according to the study, they lack “critical competences”.

Traditionally, each of the major systems integrators had their respective navies as their principal, captive customer. However, due to decreasing defence budgets in Europe, they had to find new markets and hence export markets account for 42% of the European naval order book value. In addition, “since the 90s the industry has embarked on a diversification strategy in non-military high tech markets” from cruise liners and mega yachts to offshore oil and gas and offshore and marine renewable energies. According to the study, only BAE Systems and TKMS, at least as far as their marine business are concerned, are still exclusively engaged in naval vessels.

According to the study, this diversification strategy has created a favourable cross-fertilisation between civil and military technologies (dual-use technologies) both at the prime contractors and at supply-chain levels, thereby leading to cost-effective designs and solutions.

CHAPTER 5:
**NATURAL CAPITAL
AND ECOSYSTEM
SERVICES**



The oceans play a critical role in the Earth's system. For instance, the water cycle, carbon cycle and climate variability depend on the physical and biological processes of the oceans. Maintaining these cycles and processes in balance is key for the services that the oceans provide to humanity and human wellbeing. In this context, this chapter discusses the importance of ecosystem services for assessing the economic value of the Blue Economy. The chapter also contains an overview of the potential economic impact of climate change and the cost of measures needed to help mitigate such an impact, as well as a brief assessment of the economic impact of ocean litter and plastic.

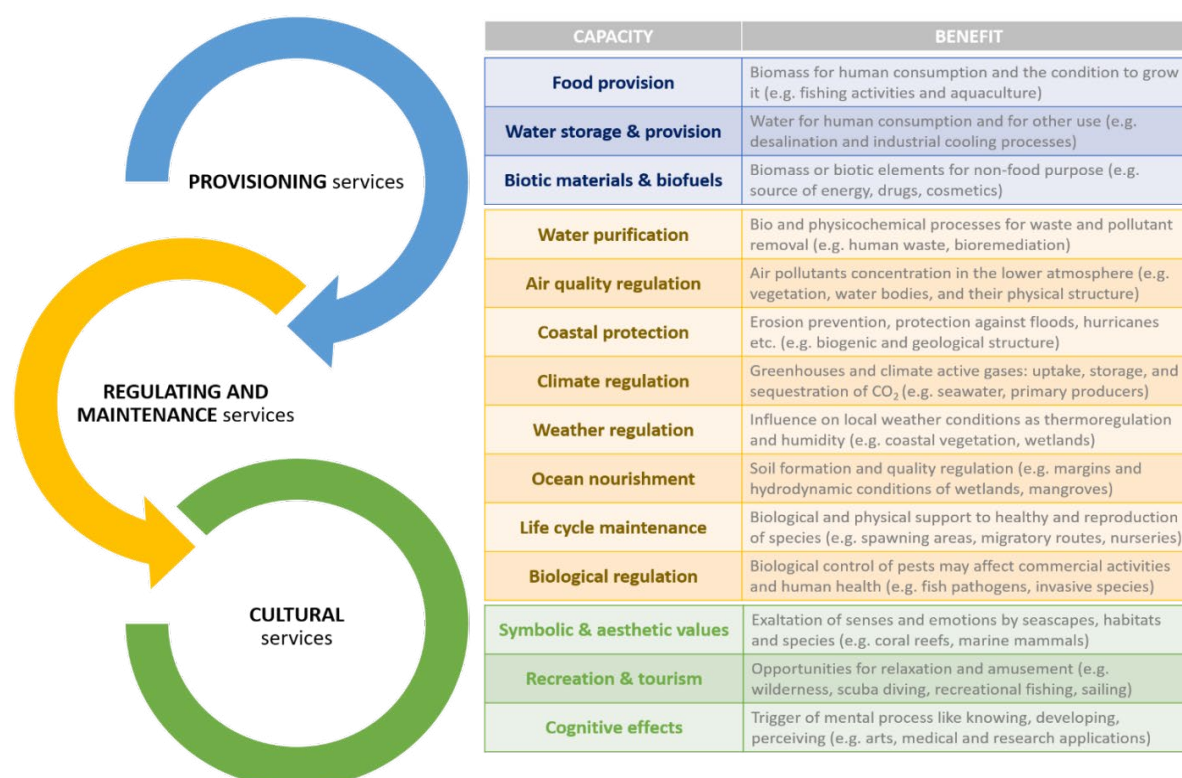
5.1. ECOSYSTEM SERVICES

Oceans play a key role in supporting human welfare, which includes providing human needs and regulating the global climate, among other benefits, known as Ecosystem Services. Such services, which directly and indirectly contribute to human welfare, can be classified into three general categories¹⁰⁸.

- **Provisioning services:** benefits obtained directly from the ecosystem (e.g. food, water, etc.);
- **Regulating services:** benefits obtained from the regulation of ecosystem processes (e.g. climate regulation, etc.);
- **Cultural services:** Non-material benefits obtained directly from the ecosystem (e.g. aesthetic, spiritual, recreation, etc.).

108. Liqueste et al. (2013) Current status and future prospects for the assessment of marine and coastal ecosystem services: a systematic review. *PLoS ONE* 8(7).

Figure 70 Capacity and benefit for each category of marine ecosystem services



Source: own elaboration from Liqueste et al., 2013

A further step is the valuation of ecosystem services and natural capital accounting: Natural Capital is the world's stocks of natural assets, which include geology, soil, air, water and living organisms, and whence the people derive and depend on a wide range of ecosystem services that make human survival and well-being possible. There are trade-offs or synergies as regards the use of natural capital and the ecosystem services they provide. Quantification is then important to take informed decisions regarding these.

The value of ecosystem services can be very difficult to quantify. Valuation of provisioning services most often rely on economic (monetary) values of the goods provided for which markets usually exist, using currency as metrics. Regulating and cultural services are usually assessed using different metrics, such as, effects on human lifespan.

The aggregated value of world's ecosystem services was roughly estimated at \$150 trillion per year in 1997¹⁰⁹. The oceans, and especially coastal zones, contribute more than 60% of the total economic value of the world's ecosystem services. Marine ecosystem, just like land and freshwater ecosystems provide not only goods and

services, but positively affect employment rates and business opportunities, further contributing to the overall human welfare.

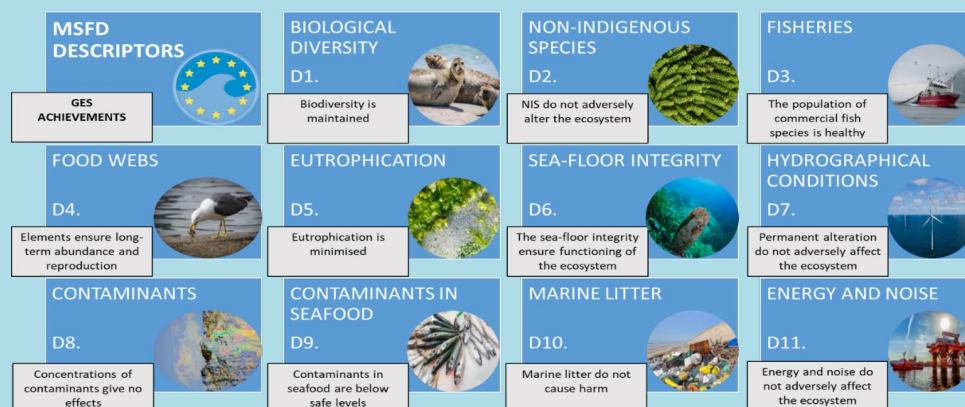
An example of a marine ecosystem service is ocean carbon sequestration. As part of the regulating services, marine ecosystems are known to play a crucial role in the global carbon cycle, as they act as an efficient sink for a significant proportion of atmosphere's carbon dioxide (CO₂) of anthropogenic origin. Estimates place the ocean's global carbon absorption at about 2 billion tonnes per year, corresponding to about 25% of anthropogenic annual emissions¹¹⁰. Carbon sequestration in the EU Mediterranean is estimated to be valued at about €2.37 million per year (about €150/km²/yr.)¹¹¹.

The extent of all these benefits depends however on the conservation and management of the ecosystems that provide them (see Box 5), as well as on their sustainable exploitation or depletion from their use by the different economic sectors. The aggregated value of world's ecosystem services is estimated to have decreased by 14% between 1997 and 2011 from \$150 trillion to \$130 trillion¹¹².

BOX 5 MARINE STRATEGY FRAMEWORK DIRECTIVE

Seeking to protect the marine environment across Europe more effectively, the EU adopted the ambitious Marine Strategy Framework Directive (MSFD)¹¹³ in 2008. The MSFD provides a comprehensive, holistic approach to the protection of European Seas, acting as the environmental pillar of the wider EU Maritime Strategy, and directly supporting the protection of marine resources and related economic and social activities. Thus, the different uses made of the marine resources and the marine environment must not be in detriment to the environmental quality of marine ecosystems, preserving its use for future generations. The Directive aims to do so by prescribing the achievement of Good Environmental Status (GES) of the EU's marine water by 2020, to "provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive". GES is defined through eleven qualitative descriptors (Figure 71), with a set of specific criteria and methodological standards.

Figure 71 MSFD qualitative descriptors and related GES achievements



Notes: All Images © Fotolia, Authors: D1: Christian Colista; D2: Shakzu; D3: Bruno Baracuda; D4: Alvinlauw; D5: Veronika Syrenko; D6: Deinos25; D7: Halberg; D8: Flukesamed; D9: Vpardi; D10: Sablin; D11: Nightman 1965.
Source: own elaboration from MSFD Directive.

109. Pendleton, L. H., Thébaud, O., Mongruel, R. C., & Levrel, H. (2016). Has the value of global marine and coastal ecosystem services changed? *Marine Policy*, 64, 156-158.

110. Sarmiento, J.L., Hughes, T.M.C., Stouffer, R.J., Manabe, S. (1998). Simulated response of the ocean carbon cycle to anthropogenic climate warming. *Nature* 245-249. Sarmiento, J.L., Wofsy, S.C. (1999). A US Carbon Cycle Science Plan. US Global Change Research Program, Washington DC.

111. Melaku Canu, D., Ghermandi, A., Nunes, P. A., Lazzari, P., Cosarini, G., & Solidoro, C. (2015). Estimating the value of carbon sequestration ecosystem services in the Mediterranean Sea: An ecological economics approach. *Global Environmental Change*, 32, 87-95.

112. Pendleton et al, 2016.

113. Directive 2008/56/EC of 17 June 2008.

The Sustainable Development Goals¹¹⁴

The sustainable management of natural capital requires a comprehensive and quantitative method to measure and monitor the health of marine ecosystems. In 2015, under the UN umbrella, world leaders adopted 17 Sustainable Development Goals (SDGs) to be achieved by 2030.

A holistic approach underpins the SDGs, as the path to global prosperity needs not only economic growth, but also addressing social needs, education, health, social protection and job opportunities, while tackling climate change. In other words, sustainable development (i.e. meeting the current needs of human society without compromising the ability for future generations to meet their own needs) encompasses three dimensions: economic growth, social inclusion and environmental protection.

Recent studies confirm that the oceans can provide significant, largely untapped, opportunities to help meet the SDGs. Filling the never-ending knowledge gaps in the marine realm can importantly contribute in achieving not only SDG 14 (Life Below Water) but also all 17 goals. The attempt to foster a thriving Blue Economy that adheres to the sustainability criteria is clearly intertwined with the SDGs, and underpins their realisation. The EU Blue Economy Report provides support to the SDGs by monitoring economic development and helping reveal opportunities and gaps.

While interaction between all SDGs and targets is complex, it is increasingly recognised that ecosystems and all the services they provide are the foundation for the socio-economic system in which industry, infrastructure and innovation are at the core.

The Ocean Health Index

While the value of ecosystem services can be very difficult to quantify, it is important to measure or estimate how sustainably people are using the ocean over time through the human-ecosystem interactions. This is precisely the goal of the Ocean Health Index (OHI), which compares and combines key elements from all dimensions of the ocean's health: biological, physical, economic and social¹¹⁵. The OHI is a synthetic index based on the following dimensions:

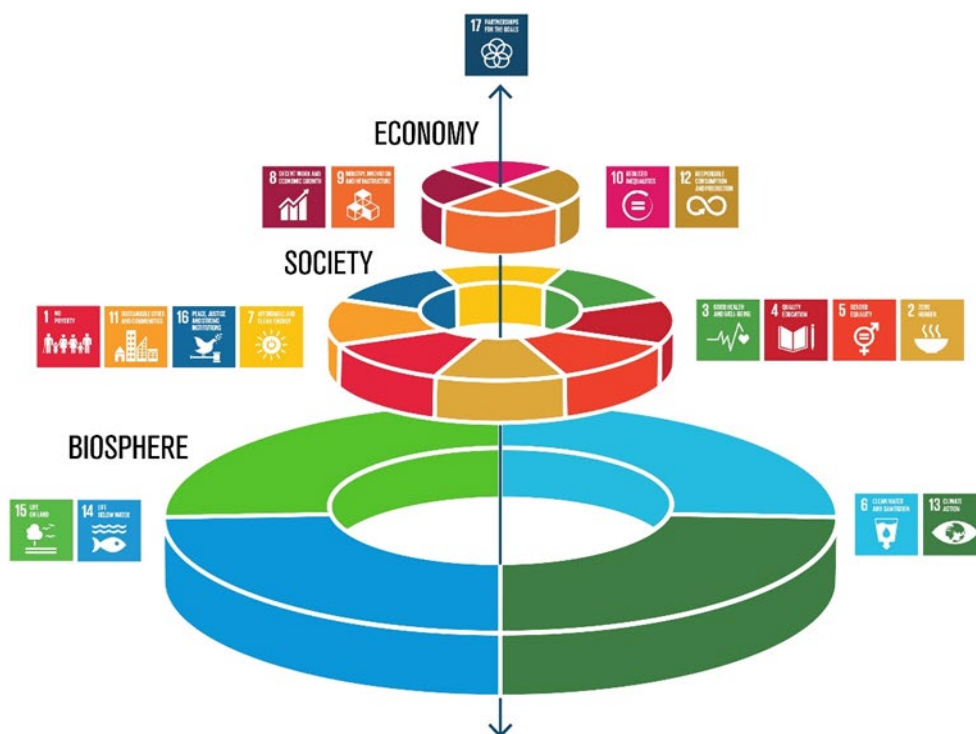
- Food provision: Harvesting and producing seafood sustainably.
- Artisanal fishing opportunities: Ensuring access to artisanal fishing for local communities.

- Natural products: Harvesting non-food ocean resources sustainably.
- Carbon storage: Preserving habitats that absorb carbon through natural coastal ecosystems such as seagrasses, tidal marshes and mangroves, which sequester and store large amounts of carbon.
- Coastal protection: Persevering the habitats (mangrove forests, seagrass meadows, salt marshes, tropical coral reefs and sea ice) that safeguard shores against storm waves and flooding.
- Livelihoods and economies: Sustaining jobs, wages and revenues and thriving coastal economies through indirect effects such as identity, tax revenue and other related economic and social aspects.
- Tourism and recreation: Maintaining the attraction of coastal destinations factoring in unemployment and sustainability.
- Sense of place: Protecting iconic species and special places that people value as part of their cultural identity.
- Clean waters: Minimizing pollution from chemicals, excessive nutrients (eutrophication), human pathogens and trash.
- Biodiversity: Supporting the health of marine ecosystem and species by maintaining the richness and variety of marine life.

114. This section builds on: FAO. Sustainable Development Goals. <http://www.fao.org/sustainable-development-goals/overview/en/>; European Commission. The Sustainable Development Goals. https://ec.europa.eu/europeaid/policies/sustainable-development-goals_en; OECD and the Sustainable Development Goals: Delivering on universal goals and targets. <http://www.oecd.org/dac/sustainable-development-goals.htm>; Food from the Oceans. Scientific advice in the area of food and biomass from the oceans. <https://ec.europa.eu/research/sam/index.cfm?pg=oceanfood>

115. Halpern et al., 2012. An index to assess the health and benefits of the global ocean. *Nature*, 488: 615-620. Ocean Health Index, 2015. Summary of results for countries and territories. 24pp <http://www.ohi-science.org>.

Figure 72 SDGs as the foundation of the socio-economic system

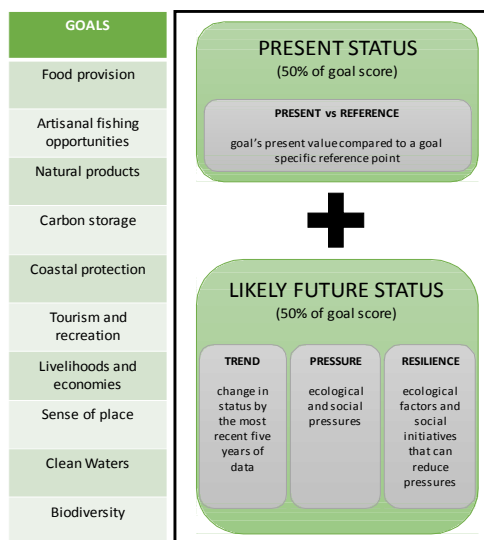


Source: Azote Images for Stockholm Resilience Centre

Figure 73 The Ocean Health Index

Conceptual framework (a)

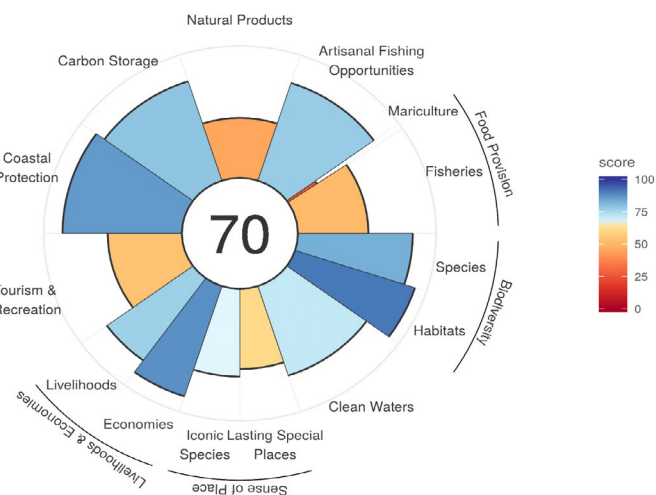
OHI – Conceptual Framework



a

Global average scores per dimension (b)

OHI – Global Average Score



b

Source : (a) own elaboration from Halpern et al., 2012; (b) www.ohi-science.org

5.2. COASTAL PROTECTION TO MITIGATE CLIMATE CHANGE

Coastal zones contain large human populations and significant socio-economic activities. They also support diverse ecosystems that provide important habitats and sources of food. One third of the EU population lives within 50 km of the coast. Globally, about 120 million people are exposed annually to tropical cyclone hazards, where since 1980, over 300,000 people have lost their lives. Climate change could have profound impacts on coastal zones due to sea level rise and changes in frequency and/or intensity of storms.

The Commission services (JRC) has carried out a coastal flood risk analysis in view of climate change for the whole European coastline¹¹⁶. The integrated risk assessment tool LISCoAST (Large scale Integrated Sea-level and Coastal Assessment Tool), was employed, building on the disaster risk methodology proposed by the IPCC SREX report¹¹⁷, defining risk as the combination of hazard, exposure and vulnerability. Projections of Extreme Sea Levels (ESLs) along Europe's coastline were produced, using dynamic models forced by CMIP5 (Coupled Model Intercomparison Project) climate projections for a moderate greenhouse gas emission mitigation scenario (RCP4.5) and a business as usual scenario (RCP8.5)^{118, 119, 120}. Extreme sea levels were translated into flood maps taking into account coastal flood protection¹²¹. For the flooded areas, direct flood damage was calculated by combining depth of flooding with land use information and regional depth-damage functions for specific land use classes. The number of people affected was estimated by overlaying the flood maps with a high-resolution population density map for Europe. Expected annual values were used to present the findings, i.e. the expected annual impact obtained after considering all possible flood events.

The study focuses on direct impacts of coastal flooding only and does not address other potential issues such as saltwater intrusion, ocean acidification or ecological impacts. Moreover, combined flooding scenarios remain an open research question for the scientific community and are not taken into account (i.e. simultaneous fluvial and coastal flooding), but are the topic of ongoing exploratory studies. Processes such as dyke failure and coastal erosion are neglected, as their consideration remains a challenge given the complex processes as well as temporal and spatial scales involved. However, the above processes can lead to additional risks, hence, it is important to highlight that the present study may underestimate flood impacts.

The effects of climate change on present society were assessed in a static economic analysis. In a dynamic economic analysis socio-economic developments were accounted for by considering gridded projections of population and GDP defined by Shared Socio-economic Pathways (SSPs) consistent with RCP4.5 (SSP1) and RCP8.5 (SSP3 and SSP5). The analysis shows how coastal flood risk may evolve in the case that no further investments are made to reduce them.

The results of the analysis are summarised in Table 13 and Figure 74. Under present climate conditions, the estimated Expected Annual Damage (EAD) for Europe is €1.25 billion, while the Expected Annual number of People Affected by coastal flooding (EAPA) equals 102 000. Under the static economic analysis, EAD is projected to rise to more than €6 billion by mid-century (respectively €6.6 billion and €8.1 billion for RCP4.5 and RCP8.5), with EAPA exceeding 450,000 (respectively 467,000 and 558,800 people for RCP4.5 and RCP8.5). In the second half of the century the figures diverge more strongly between the two RCPs. By 2100, due to the effects of climate change only, EAD (EAPA) could rise to €27 billion (1.3 million people) under RCP4.5 and to €59.8 billion (2.1 million people) under RCP8.5. Impacts at 2°C warming are similar to those around 2050, but are larger under the RCP4.5 scenario compared to RCP8.5. This is a consequence of the "inertia effects" of global warming on sea level rise (SLR). Because the rate of warming is higher under RCP8.5, with 2°C warming occurring around 2043, the effect of SLR are less pronounced compared to RCP4.5, for which 2°C warming is projected around 2057. However, at any specific point in time, impacts under RCP8.5 would always be larger than those under RCP4.5.

The projected impacts are substantially higher taking into account socio-economic development. EAD for Europe is estimated to reach €156 billion, €93 billion and €961 billion under RCP4.5-SSP1, RCP8.5-SSP3, and RCP8.5-SSP5, respectively, by the end of the century. For the same year, EAPA will rise to 1.53, 1.52, and 3.65 million people who could suffer yearly floods due to extremely high sea levels. Impacts will put increasing pressure on coastal communities, with 160, 28,120 and 28,340 people under RCP4.5-SSP1, RCP8.5-SSP3, and RCP8.5-SSP5 respectively being forced to relocate towards the end of the century.

The study allows for quantifying the relative importance of the different physical and socio-

116. Voudoukas, M. I. et al. Climatic and socioeconomic controls of future coastal flood risk in Europe. *Nature Climate Change*, doi:10.1038/s41558-018-0260-4 (2018).

117. IPCC. Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. (Cambridge University Press, 2012).

118. Voudoukas, M. I. et al. Global probabilistic projections of extreme sea levels show intensification of coastal flood hazard. *Nature Communications* 9, 2360, doi:10.1038/s41467-018-04692-w (2018).

119. Voudoukas, M. I., Mentaschi, L., Voukouvalas, E., Verlaan, M. & Feyen, L. Extreme sea levels on the rise along Europe's coasts. *Earth's Future*, n/a-n/a, doi:10.1002/2016EF000505 (2017).

120. Voudoukas, M. I., Voukouvalas, E., Annunziato, A., Giardino, A. & Feyen, L. Projections of extreme storm surge levels along Europe. *Clim. Dyn.* 47, 3171–3190, doi:10.1007/s00382-016-3019-5 (2016).

121. Voudoukas, M. I. et al. Developments in large-scale coastal flood hazard mapping. *Natural Hazards and Earth System Science* 16, 1841–1853, doi:10.5194/nhess-16-1841-2016 (2016).

Table 13 Coastal-flooding impacts in the EU, mean projections

Expected annual damage, € billion

Impact	Scenario	Baseline	2030	2050	2080	2100	2°C
Socio economic	RCP4.5-SSP1	1.25	2.4	3.9	6.1	7.2	4.4
	RCP8.5-SSP3	1.25	1.7	2.0	2.0	1.9	1.9
	RCP8.5-SSP5	1.25	2.8	5.5	12.4	19.5	4.3
Physical	RCP4.5-SSP1	1.25	3.7	6.6	16.6	27.0	8.9
	RCP8.5-SSP3	1.25	3.9	8.1	28.4	59.8	6.0
	RCP8.5-SSP5	1.25	3.9	8.1	28.4	59.8	6.0
Total	RCP4.5-SSP1	1.25	7.5	21.0	80.9	155.9	35.0
	RCP8.5-SSP3	1.25	5.3	12.5	45.2	92.7	9.0
	RCP8.5-SSP5	1.25	9.3	39.4	293.8	961.0	22.3

Expected Annual number of People Affected, thousand people

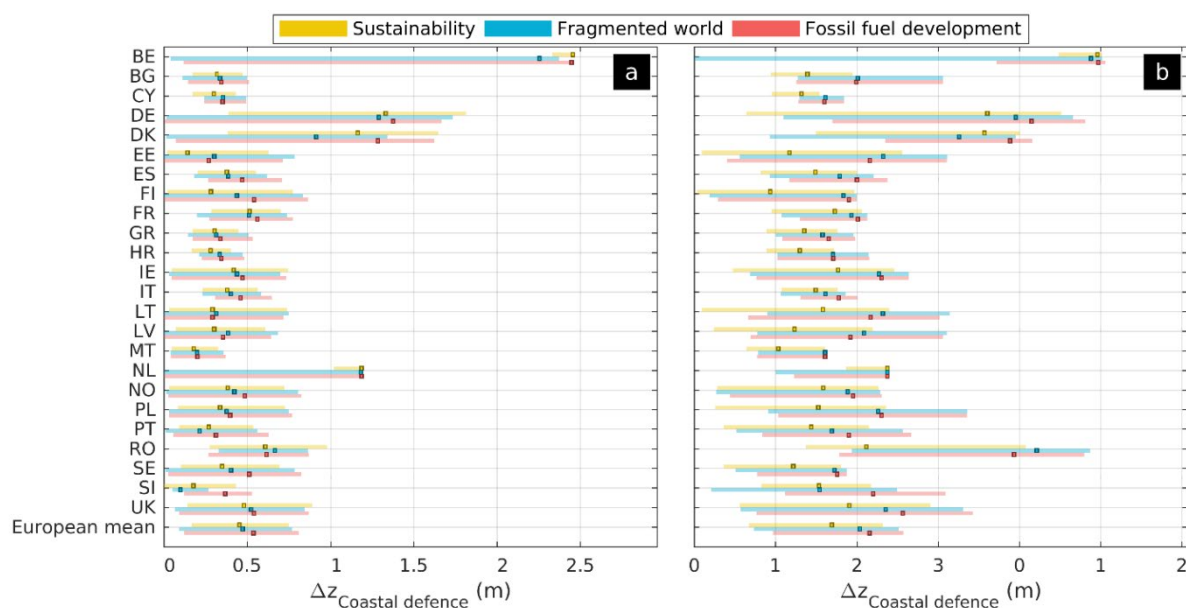
Impact	Scenario	Baseline	2030	2050	2080	2100	2°C
Socio economic	RCP4.5-SSP1	101.9	111.4	117.9	118.7	109.6	118.1
	RCP8.5-SSP3	101.9	103.6	99.0	84.4	74.4	101.5
	RCP8.5-SSP5	101.9	116.0	131.3	151.3	156.7	125.8
Physical	RCP4.5-SSP1	101.9	272.5	467.9	975.2	1,329.9	586.3
	RCP8.5-SSP3	101.9	290.8	558.8	1,359.3	2,078.2	436.0
	RCP8.5-SSP5	101.9	290.8	558.8	1,359.3	2,078.2	436.0
Total	RCP4.5-SSP1	101.9	298.6	540.4	1,173.2	1,531.8	688.1
	RCP8.5-SSP3	101.9	293.7	532.8	1,139.6	1,518.9	428.9
	RCP8.5-SSP5	101.9	335.7	741.6	2,203.6	3,650.4	545.4

Source: JRC.

economic parameters. Findings show that climate change is the main driver of the rise in coastal flood risk. Among the physical parameters, warming-induced sea level rise appears to be more a prominent factor than changes in the frequency and intensity of extreme meteorological events. A rise in Sea level increases the magnitude of ESLs in such a way that they more frequently overtop existing coastal protection or natural barriers. Coastal flood risks are further amplified by economic growth, yet the projected augmentation in wealth also implies an increase in the capacity to absorb the rise in coastal flood risk.

The increasing burden of coastal flood damage on European societies calls for investments in adaptation measures. This can easily be justified, as the benefits of coastal protection outweigh the costs, especially along densely populated areas and valuable assets. Considering that sea levels will keep rising even under the most optimistic scenarios, due to ongoing and past emissions, such a cost-benefit analysis of adaptation options for Europe is an ongoing effort. It will be included in the next edition of the present report. Preliminary results show that in order to keep 2050 and 2100 EAD as a percentage of the GDP to present days standards, EU member states will in average need to raise existing coastal protection by around 0.5m and 1m, respectively.

Figure 74 Estimated rise flood protection needed to keep EAD to present day levels in 2050 (a) and in 2100 (b).



Notes: Lighter patches represent the 5–95% quantile range and the squares show the median.

Source: JRC.

BOX 6 THE SAND MOTOR

Increasingly used for coastal defence, works to safeguard dunes, beaches coastal areas and even whole islands¹²², the case of the Sand Motor in the Netherlands is paradigmatic and unique in the world.

Given that a significant part of the Dutch territory is below the sea level, the Ministry of Infrastructure and Water Management has to deposit sand on the beaches and in the offshore area to replenish the sand that is taken by the sea from the Dutch coast.

In 2011, the Dutch authorities constructed a Sand Motor, a sand peninsula with the aim of making nature itself to spread sand along the coast instead of taken it away. Therefore, the goal is to protect the coast in a more sustainable and natural way. The Sand Motor works with water, instead of against it. If it works as expected, after depositing a large amount of sand in a single operation (21.5 million cubic metres), sand replenishment off the Delfland Coast will be unnecessary for the next 20 years¹²³.

122. European MSP Platform. Technical Study: MSP as a tool to support Blue Growth. Sector Fiche: Marine aggregates and Marine Mining. Final version: 16/02/2018 (and references therein). www.msp-platform.eu.

123. For more information: www.dezandmotor.nl/en/home.

5.3. ECONOMIC IMPACT OF OCEAN LITTER AND PLASTIC

Plastic plays an important role in the economy. Society benefits from this inexpensive material. Unfortunately, the low cost of plastic production is in dissonance with the potentially high cost of its leakage into the environment. Plastic contamination is projected to increase as the human population grows towards an expected 9 billion by 2042¹²⁴. Instead of staying within the economy, the significant value inherent in plastic is lost when plastics become litter. Marine litter is a pressing and growing global environmental challenge: of the more than 300 million tonnes of plastic produced every year, it has been estimated that 9 million tonnes end up as waste in the oceans and beaches. This represents an important opportunity cost to economies¹²⁵ and a degradation of marine ecosystems.

Counteracting and preventing marine litter can enable materials and their value to remain in a Circular Economy, and boost economic opportunities for enterprises that bet on sustainable development. The litter arises from various economic sectors and activities, either directly or indirectly¹²⁶, and inaction leads to rising economic, social and environmental costs. The European Union is supporting the transition to a Circular Economy with a broad set of measures to maintain the value of products, materials and resources for as long as possible, while minimising the generation of waste and turning waste into valuable resources (Figure 75). The Circular Economy is a win-win situation with several socio-economic benefits, such as savings of €600 billion for EU businesses (equivalent to 8% of their annual turnover), creation of 580,000 jobs and reduction of EU carbon emission by 450 million tonnes by 2030¹²⁷.

Generally, reliable and validated data are rarely available and impacts are indirect, unproven, or even unknown in order to estimate the consequences of marine litter at economic level. Nevertheless, recent studies reveal significant costs of marine litter impacts on tourism and recreation, shipping and yachting, fisheries, and aquaculture, particularly in the form of time and money wasted in cleaning marine litter from their nets, farms, etc. For example, the cost of professional beach litter removal in the UK is estimated at €7,000 per Km² per year¹²⁸. While the costs of action vary depending on where the measures are focused in the value chain and waste hierarchy, it is thought that the costs of action are generally much less than those of inaction, which have impact on the EU economy (Table 14).

Mismanaged land-based waste and downstream marine litter have significant detrimental effects on the environment, public health and the economy. Indeed, significant economic costs are associated with potential future degradation of the ecosystem, reduction of food production, human health issues and the ongoing “global warming”, which is also affected by aging plastic releasing trace gasses that contribute to the greenhouse effect. The extent of the role of marine litter is yet to be quantified and specialised studies are necessary to understand poorly known processes, responsible for changes in litter properties, degradation, and interaction with the ecosystem and socio-economic factors.

An economic value can be assigned to the environmental benefits of a quality environment through legislation. For instance, a reduction of pollution and energy costs due to the substitution of recycled materials for virgin materials or decreased public health risks and cleaning costs coupled with an increase in aesthetic value resulting from less litter in public places. To reduce marine litter and mitigate its impacts, two varieties of legislation are currently in use:

1. Command and control measures, defined as direct regulation of activities or unwanted items by legislation (e.g. bans on plastic microbeads in cosmetic products in the UK; or prohibition on single use plastic bags and other items in EU Member States);
2. Market-based economic instruments, defined as financial incentives or disincentives and internalisation of costs aimed at influencing human behaviour (e.g. plastic bag levies or disposal taxes).

Consumers and manufacturers have responsibility for product stewardship. Shifting from a make-use-dispose culture to a make-reuse-repurpose-recycle culture will make significant strides in reducing the amount of plastic entering the environment and negatively affecting the economy.

The EU is actively involved in the Implementation of the UN Environment Assembly Commitments (e.g. SDG14 and 12 targets) and G7 Action Plan on Marine Litter. The focus is the promotion of the socio-economic benefits of establishing policies for marine litter prevention, waste reduction and resource efficiency, waste/storm water management, public awareness, education & research, and the promotion of stakeholders' engagements.

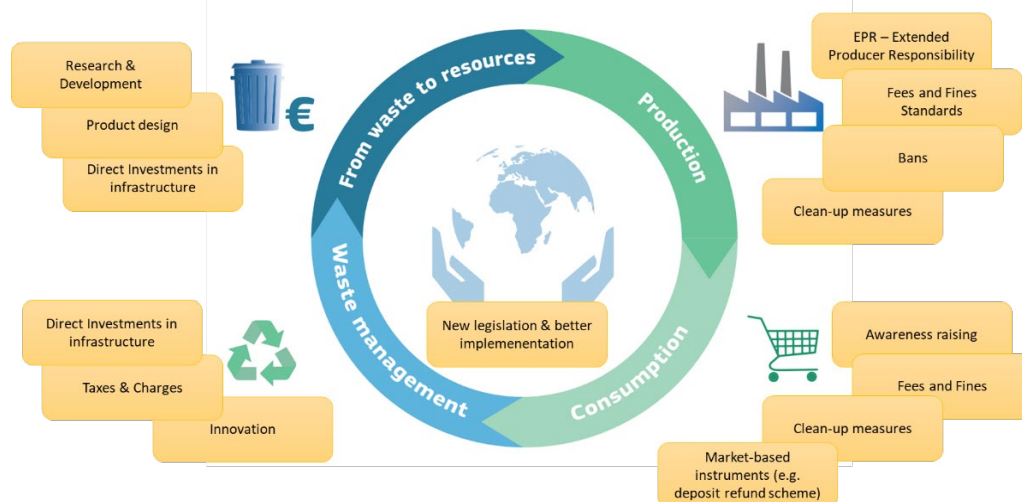
124. Maximenko, N., Corradi, P., Law, K.L., Van Sebille, E., Garaba, S.P., et al. (2019). Towards the Integrated Marine Debris Observing System. *Frontiers in Marine Science*.

125. UN Environment (2017). *Marine litter socio economic study*. United Nations Environment Programme, Nairobi, Kenya.

126. ten Brink, P.; Schweitzer, J.-P.; Watkins, E.; Howe, M. (2016) *Plastics Marine Litter and the Circular Economy*. A briefing by IEEP for the MAVA Foundation.

127. European Commission (2015). *Closing the loop: an ambitious EU Circular Economy package*. Factsheet on the circular economy

128. Mouat, J., Lopez Lozano, R., Bateson, H., (2010). *Economic Impacts of Marine Litter*. KIMO Report, 105pp.

Figure 75 Plastics circular economy and example of instruments (in yellow) to tackle marine litter

Source: own elaboration.

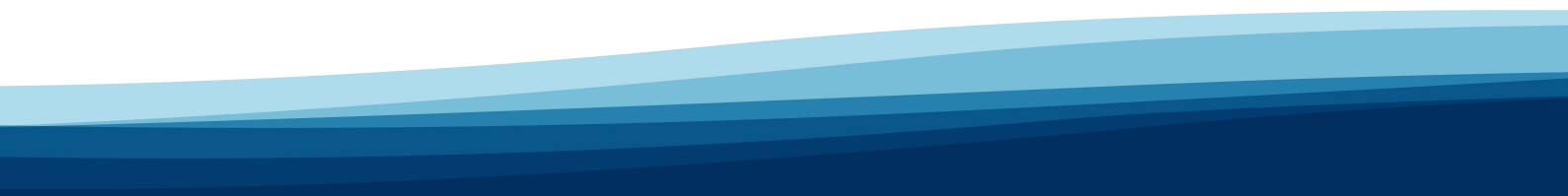
Table 14 Estimated impact of marine litter in the EU

Sector	Impact	Annual cost € million or employees	(Lost) revenues Percentage
Fishing*	Lost revenue	162.0	2.1
Aquaculture	Lost revenue	2.0	0.04
Shipping	Repair costs	3.9	0.1
Tourism	Lost revenue	350.0	0.5
Tourism	Lost jobs	5,590	0.3
Government	Waste collection (packaging material)	4,000.0	6.3
Government	Waste remediation activities	6,000.0	3.7
Government	Coastal clean-up activities	194.6	3.2-10.5
Government	Fishing for litter	3.7	-

Notes: *For fishing, other sources estimate the cost to range between 1% and 5 % of the total revenue generated by EU Fleet (i.e. €80-385 million a year).

Source: Own elaboration based on various sources

CHAPTER 6: **CASE STUDIES**



Five case studies have been selected to further illustrate, in the form of examples and best practices, certain Blue Economy elements, activities or sectors. These cases help depict the broadness and variety of the Blue Economy, which goes beyond what is discussed in previous chapters. Future editions of this report will contain additional case studies and may look at following up on some of those contained in this edition.

The first case study is on indirect and induced employment at the Meyer Werft Shipyard, illustrating the multiplier effect of the activities in the Blue Economy. A second case study presents the Copernicus Marine Environment Monitoring Service (CMEMS) and how this system supports the monitoring and measuring of the Blue Economy, serving as a catalyst for many of activities within it.

The third case study looks at the specific socio-economic benefits provided by Marine Protected Areas (MPAs), which have long been disregarded and, which are little documented or measured. It includes a number of cases and examples where data collection and measurement has been attempted.

The case study that follows focuses on the maritime economy in the Brest area in Brittany (France). It gives an overview of the contribution of maritime activities and sectors to the local economy and specifically evaluates the impact of the marine research and education in terms of employment. Lastly, a final case study highlights the role of the European Investment Bank in supporting investment in both the established and emerging sectors of Blue Economy, offering examples of specific projects.

6.1. DIRECT AND INDIRECT ECONOMIC IMPACT OF SHIPBUILDING: THE CASE OF MEYER WERFT

Blue Economy activities have a strong interdependency with other economic activities resulting in a high capacity to create additional jobs and value added along the value chain in the local and regional economies. This case study illustrates the multiplier effect in the regional and national economies of highly integrated Blue Economy, at regional and national level, for every direct job at Meyer Werft.

When attempting studies that illustrate the economic benefits and impacts of various Blue Economy sectors, it is much easier to focus on direct impact than indirect. The reason being that the former are simpler to calculate, whereas for the latter more in depth research and complex methodology must be developed. Direct impact tends to be straightforward, as it relies on those activities, which almost entirely relate to the one sector, whilst indirect activities may include the entire supply chain and activities induced by other sectors and activities.

The district governments of Leer and Emsland estimated the economic impact of both direct and indirect activities of Meyer Werft for the regional and national economies in terms of employment, in the hope that it can better depict the importance of the sector. Meyer Werft is based in Papenburg, a city in the district of Emsland in Lower Saxony, Germany, on the border with Leer, the neighbouring district. Meyer Werft, as a worldwide leading cruise ship builder, forms an industrial hub in the region, whose effects radiate far into Lower Saxony, the whole of Germany and consequently the EU.

In 2014, the districts published a detailed study on the economic benefits and impacts derived from the shipyard activities. An update covering 2015–2020 was published in 2017¹³⁴. The study seeks to estimate the economic and fiscal effects resulting from the economic activities of Meyer Werft in the administrative districts of Emsland and Leer and beyond.

In 2015, Meyer Werft directly employed about 3,330 people, 93% of whom live in the districts of Emsland and Leer. In addition, in the region there is an employment volume of about 2,860 full-time jobs at direct suppliers and more than 120 at indirect suppliers, which are dependent on the demand of Meyer Werft.

Moreover, an employment volume of around 1,060 full-time jobs is based on income-induced demand effects of all employees in the region. The total direct, indirect and income-induced employment effect in the region of the administrative districts

Emsland and Leer is thus calculated to be of about 7,370 employees.

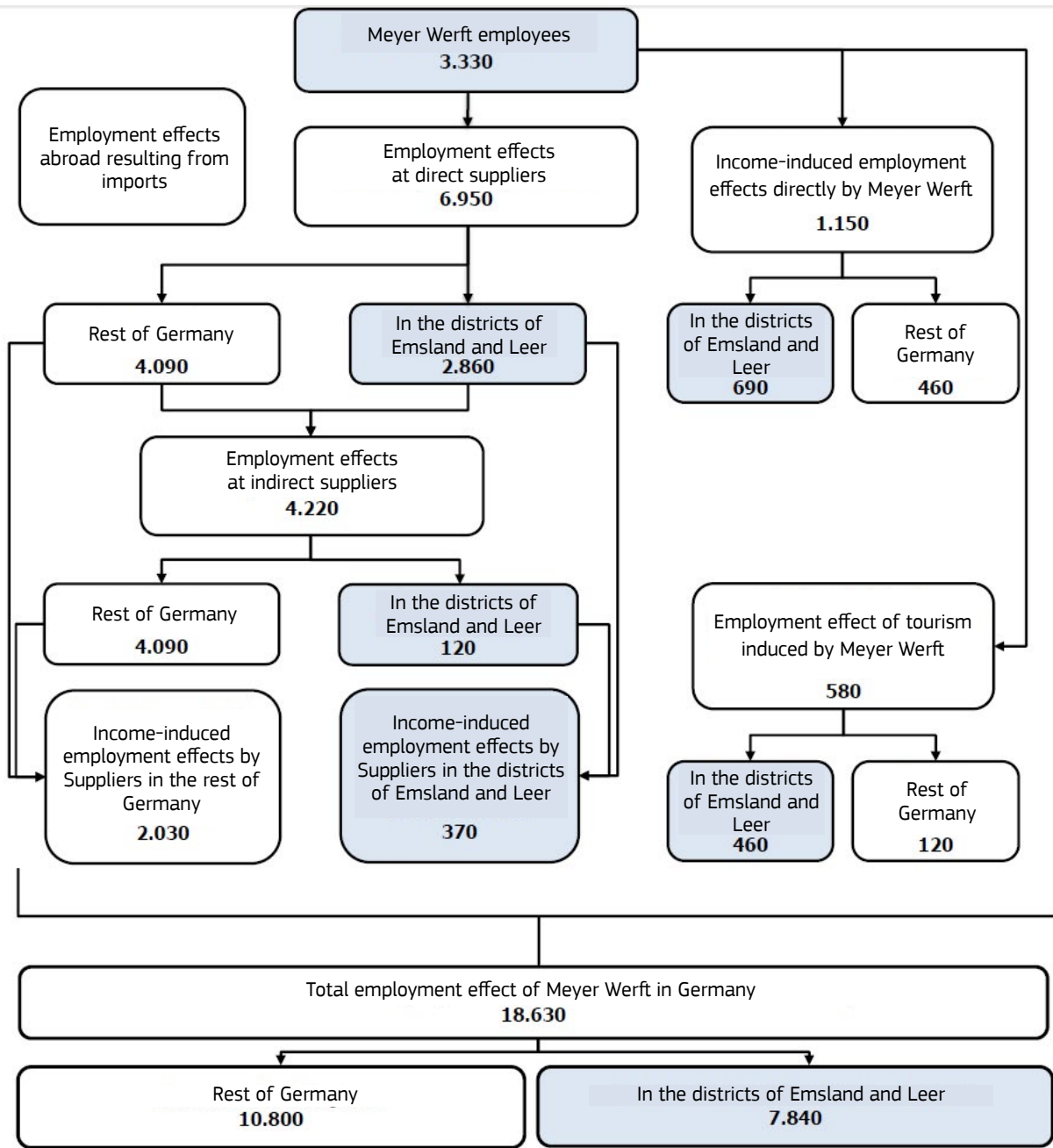
The tourism generated by the shipyard is also a sustainable source of employment. Tourism expenditure also includes business travellers' expenses, including employees of shipping companies and suppliers. According to new calculations, the estimated employment effect of shipyard-induced tourism for the 2015 amounts to the equivalent of around 460 full-time jobs in the districts of Emsland and Leer.

In Germany as a whole, Meyer Werft contributed to around 18,630 full-time jobs in 2015 (3,330 Meyer Werft employees; 6,950 at direct suppliers; 4,220 at indirect suppliers; 3,550 income-induced by Meyer Werft and suppliers; 580 through tourism induced by Meyer Werft). Of these, 7,840 were located in the districts of Emsland and Leer, and almost 10,800 in the rest of Germany. It is in the interest of the sector as a whole to find methods of measuring and calculating the economic impact of indirect activities not just for shipyards, but also in all Blue Economy sectors, to properly illustrate the size and importance of it.

This case study illustrates this high multiplying effect of shipyards by estimating almost six additional jobs in related activities, at regional and national level, for every direct job at Meyer Werft. Similar exercises for other sectors could properly demonstrate the size and importance of the Blue Economy as a whole.

134. Die regionalökonomische Bedeutung der Meyer Werft: Aktualisierung für die Jahre 2015 bis 2020.

Figure 76 Employment effects resulting from the economic activities of Meyer Werft



Source: Meyer Werft, Sea Europe

6.2. COPERNICUS MARINE ENVIRONMENT MONITORING SERVICE

Copernicus is the European Union's Earth observation and monitoring programme and was launched in 2014 to establish an operational European capacity to deliver Earth Observation data and related value-added services in the fields of environment, emergency management and security. To achieve its goals, the Copernicus programme is composed of a satellite component with a set of satellite infrastructures, an in-situ component and six Copernicus information services (addressing land monitoring, marine environmental monitoring, security, emergency, climate and atmosphere monitoring) that respectively produce Earth Observation data and information products of European or global interest to support these user needs. Data and information products delivered by the Programme are subject to a free, full and open data and information policy¹³⁵.

Operational since 2015, the Copernicus Marine Environment Monitoring Service (CMEMS)¹³⁶ provides information on essential ocean variables such as currents, temperature, salinity, wind, waves, transparency, oxygen, plankton, primary production and up to 160 oceanographic data products. With over 16,000 subscribers worldwide, the Copernicus Marine Service is an important advantage for supporting the Blue Economy and Sustainable Oceans. Many subscribers are intermediate users that provide services to multitude of final users.

The Copernicus Marine Service is designed to serve many commercial and scientific purposes as well as to support European Commission

policy implementation like the Marine Strategy Framework Directive, the Maritime Spatial Planning Directive or the Common Fishery Policy). Combating pollution, monitoring marine protected areas and its species, maritime safety and routing, sustainable exploitation of ocean resources, marine energy resources and climate monitoring are just a few application examples.

The usefulness of CMEMS is reflected in the increasing number of users not only among universities and public authorities, but also among businesses from different domains (maritime safety, coastal and marine environment, marine resources or weather forecast). By 2018, CMEMS had almost 4,000 regular users (Figure 77).

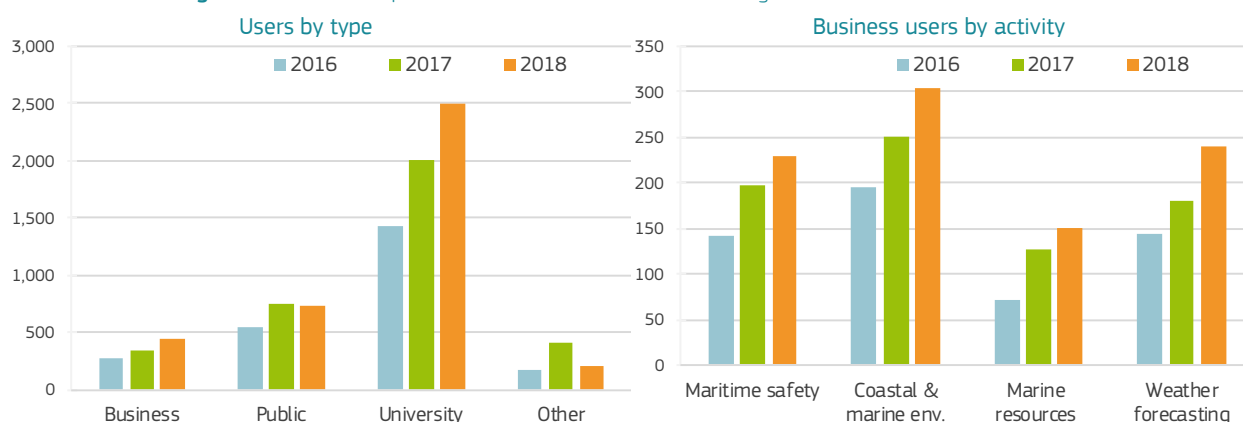
CMEMS has gathered over 120 concrete illustration of usage from current users. Below are three examples of services in support of marine renewable energy, sustainable fisheries and aquaculture and safe shipping.

Supporting marine renewable energy: As discussed in Section 4.1, the oceans generate energy in many ways e.g. from currents, tides or waves as well as from gradients in temperature or salinity. The Copernicus Marine Service supports marine renewable energy farms throughout its whole life cycle: from its development, design and construction to its operations. Environmental conditions such as ocean current, swell and wind can significantly affect operations at sea as well as performance of the energy sites; therefore, the selection of those is even more crucial.

135. Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013 supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information Text with EEA relevance

136. <http://marine.copernicus.eu>

Figure 77 Users of Copernicus Marine Environment Monitoring Service



Source: CMEMS.

Supporting sustainable fisheries and aquaculture: A new sustainable strategy for fisheries is becoming possible as a result of innovative numerical modelling of the marine ecosystem and food chain, from small organisms to top predators. Since 2019, the Copernicus marine service delivers observation of micronekton species in the mid-trophic layer of the food web, which are then eaten by the tuna population, thus making it possible to improve fish stock management and adapt European policies. Monitoring data for larvae location and habitat models coupled with oceanographic data such as temperature, salinity and chlorophyll, support fisheries management approach based on “fish population dynamic spatial planning”.

The selection of appropriate siting of aquaculture farms is crucial for their long-term sustainability and depends on many parameters. Moreover, monitoring water quality is a critical factor when culturing any aquatic organism to ensure healthy growth and survival. Some water quality parameters such as temperature, dissolved oxygen, pH, ammonia, and nitrites are provided daily as observation and even forecasts by Copernicus for the aquaculture industry.

Supporting safe shipping: Maritime transport accounts for more than 80% of international freight transport. Ship routing allows maritime shipping companies to reduce fleet navigation risks, save fuel and reduce CO₂ emissions. The Copernicus Marine Service provides daily forecasts of ocean current, wave height and sea ice parameters for the global oceans and European Seas used in ship routing software. Beyond ship weather routing, routing by currents is a recent and innovative approach, using surface currents for ship routing in areas where the weather conditions do not prevail may allow saving about 1% of the fuel consumption resulting in a reduction in costs and in CO₂ emissions.

The Copernicus market report¹³⁷ testimonies of the actual benefits for the economy of using space resources provided by Copernicus. The Blue Economy has been assessed in several sectors like Ocean monitoring (for all economies related to ocean health, ecosystem services and coastal development), the renewable energies and oil & gas sectors. The trends are highlighted along the value chain measured for the sector of intermediate service providers and also the final market sector.

137. Copernicus market report issue 2 (2019 prepared by PwC, available on <https://www.copernicus.eu/en/documentation/studies-and-surveys/studies-and-surveys>)

6.3. MPAS AND THE BLUE ECONOMY

As both the Blue Economy and the Marine Protected Areas (MPAs) network continue to expand, there is a need to better understand – and an opportunity to better harness – the positive links between them. Recent research commissioned by the European Commission through EASME¹³⁸ has explored the market benefits for sectors and stakeholders directly affected by an MPA. The research found a broad set of potential (economic) benefits and ways they can be delivered, but these are little documented or measured.

Economic benefits stemming from MPAs

MPAs can benefit the Blue Economy through a number of different mechanisms. MPAs are policy tools for conservation and are not engines for economic growth. However, at the same time, they can deliver conservation and tangible economic benefits. Firstly, there is evidence that tourism and parts of the commercial fishing sector – notably coastal small-scale fleets – can, under

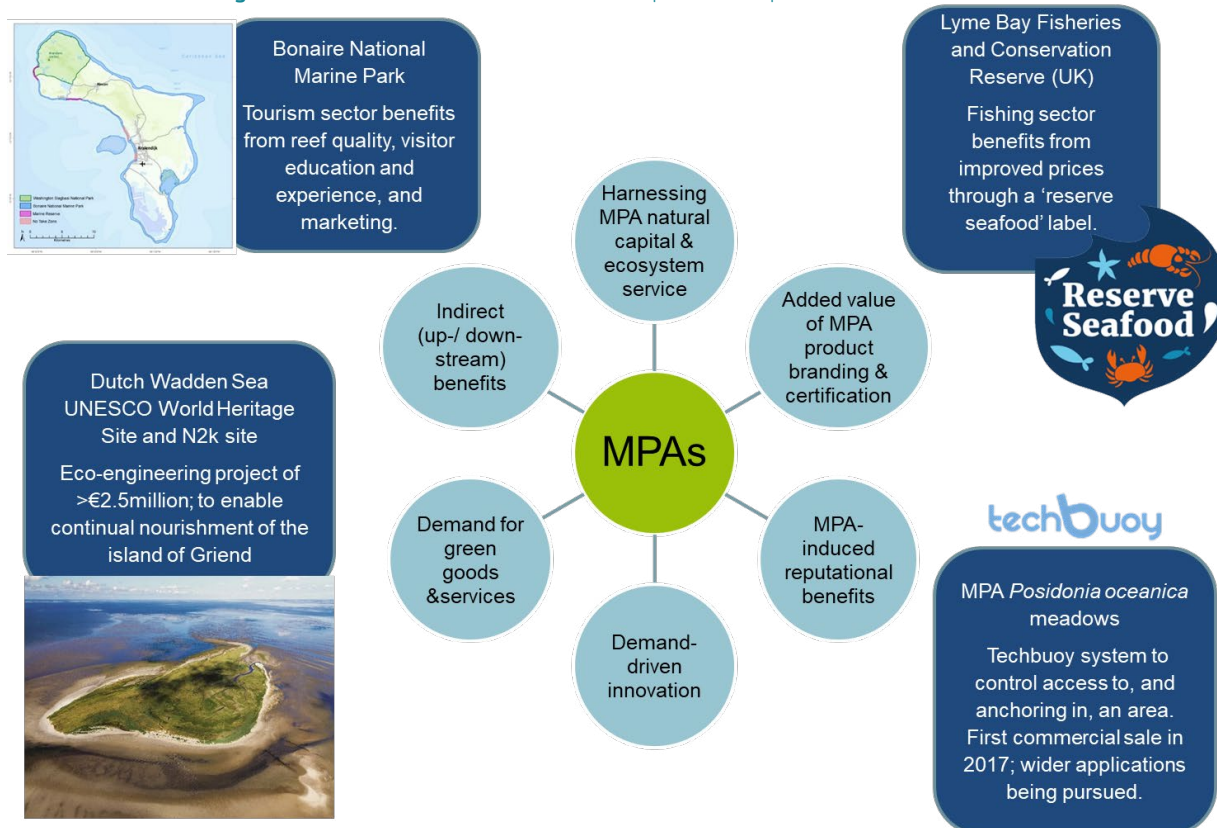
the right conditions, realise economic benefits based on improvements in biodiversity, the wider environment and resulting ecosystem services. However, the benefits from MPAs can be cast wider across the Blue Economy even for sectors not directly reliant on the ecosystem services supported by MPAs (Figure 78).

This is most clearly apparent for those Blue Economy sectors that benefit from MPAs as direct drivers of demand for their services – for example, conservation management, investment in habitat restoration and biological research, monitoring and surveillance technologies and providers of environmental consulting services.

Economic benefits may be more likely to materialise if they are planned for as a component of MPA design, management and governance. Where MPAs help to stimulate innovation and shifts towards green practices (lowering the environmental impact of activities within an MPA), institutional and other resources are often needed to determine and agree acceptable practices and to support investment. In the most successful

138. ICF, IEEP and PML (2018). Study on the Economic Benefits of MPAs and SPMs. European Commission – Abridged Report. Available at: <https://publications.europa.eu/en/publication-detail/-/publication/164a24f2-b0bf-11e8-99ee-01aa75ed71a1>

Figure 78 Benefit mechanisms of MPAs and specific examples



Source: ICF, IEEP and PML (2018).

examples, MPAs are catalysing sustainable economic benefits, with MPA management bodies (or similar) acting as a forum, bringing together the organisations, expertise and financial resources necessary to capitalise on the available opportunities. These fora can facilitate engagement between different stakeholders to explore potential synergistic relationships.

Cost-benefit assessment of MPAs

Whilst the Study on the Economic Benefits of MPAs and SPMs¹³⁹ draws together examples of economic benefits, there is limited evidence on the scale or pervasiveness of such benefits. In addition, there remains a lack of robust evidence on the net benefits for Blue Economy sectors – the scale of benefits once costs are taken into account. In many instances, the scale of potential sectoral benefits may not match the costs.

Despite advances in MPA science and economic analysis, there are few comprehensive ex-ante or ex-post cost benefit analyses (CBAs) of MPAs in Europe or worldwide. Existing studies comparing the costs and benefits of MPAs use primarily an ecosystem services framework and suggest that a large proportion of benefits relate to non-market improvements in societal welfare rather than real economy benefits to sectors. Despite being unable to account for a comprehensive representation of benefits in monetary terms, the few studies available conclude that the overall welfare benefits (when non-market benefits are included) of MPAs exceed total costs. However, in terms of just impacts to the real economy – market benefits to Blue Economy sectors – there is very limited evidence examining the costs and benefits for any given sector.

Monitoring and evaluating MPAs

Monitoring and evaluation supports delivery of effective MPAs and stakeholder buy-in. Proper management and enforcement is essential if MPAs are to deliver on their conservation objectives – and if sustainable economic benefits are to be realised and sustained.

It is important that the reasons behind site designations are made clear, that stakeholders believe that decisions have been made on the best available evidence and know what they can expect as a result of the MPA designation. This can help to foster early buy-in by dispelling unfounded concerns about the potential impact of an MPA.

Over the longer term, delivering effective management, and enabling the realisation of economic benefits (in addition to conservation

benefits) provides a route to increasing and retaining local stakeholder buy-in. This in turn can enhance MPA management legitimacy, stakeholder compliance and conservation benefits.

Monitoring and evaluating MPAs is critical for the development of robust evidence of their impacts. This evidence can be used not only to inform MPA management, but also to support expectations of likely future MPA benefits, and demonstrate those benefits to stakeholders as and when they materialise.

However, in general, MPAs are not monitored or evaluated for their social and economic impact. Existing monitoring is often narrow and incomplete, typically focusing only on ecological impacts. In some cases, a lack of social and economic monitoring is a consequence of the legislation driving MPA designation. For example, Natura 2000 sites are only required, as a minimum, to monitor the species or habitats for which the site has been designated, as these must be reported under Article 17 of the Habitats Directive. Their conservation status determines whether the site is achieving its objective. Impacts on other species, including ones of commercial interest, typically remain unmonitored.

While a wider monitoring would imply the allocation of additional resources, it is a missed opportunity to obtain hard information with which to enter into debate with economic sectors. A more complete, long-term monitoring and evaluation programme – that includes items of economic relevance – would support greater understanding of the benefits of MPAs.

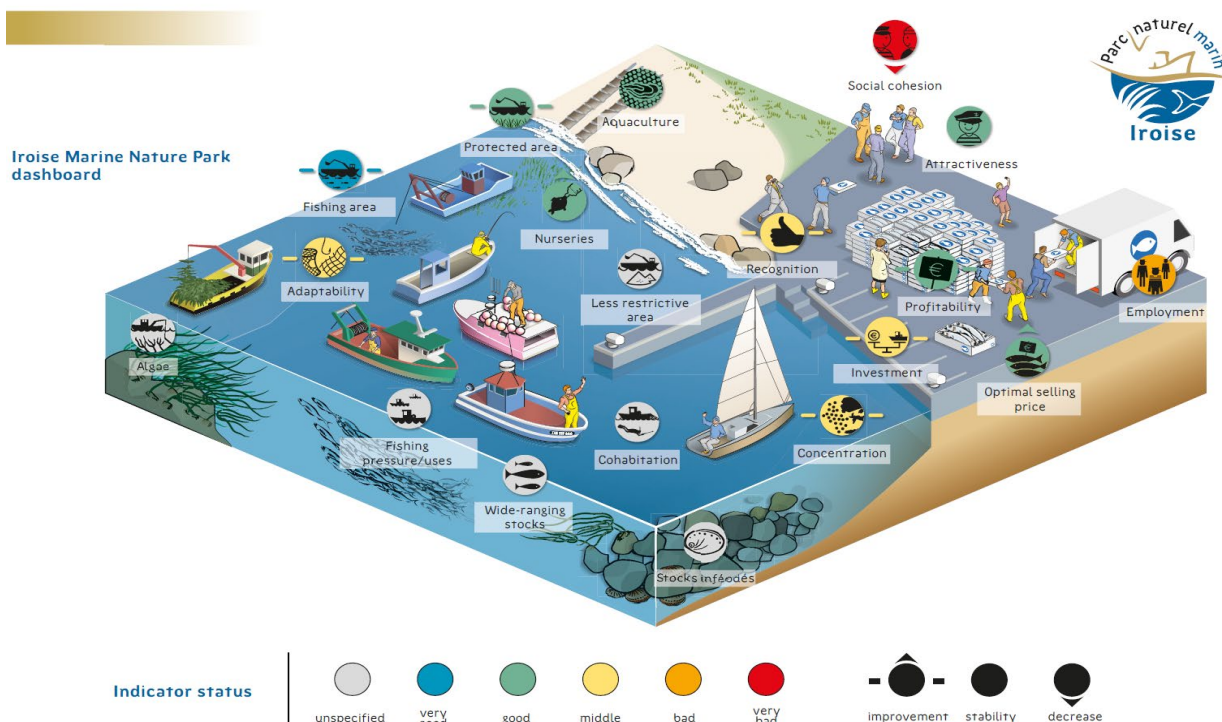
Social and economic monitoring examples

The study found some examples of full social, economic and ecological monitoring and evaluation associated with MPAs. In some cases, these provide information to guide ongoing management. Typically, they have remained time-limited and periodic. In large part, this is driven by the availability of funding to conduct monitoring and evaluation.

In Os Miñarzos (Spain), ecological monitoring as well as social and economic monitoring of fishing activity was carried out although the funding to do so was only available during the early years of the MPA.

In Lyme Bay MPA (UK), social, ecological and economic monitoring has been undertaken on a periodic basis. It was initially funded by the UK Government, and more recently by the Blue Marine Foundation, an NGO that has been assisting the management and development of the MPA.

139. ICF, IEEP and PML (2018).



Source : Agence des aires marines protégées

Monitoring of the management plan for Iroise Marine Nature Park (France) is reported upon annually via a 'dashboard' of indicators, alongside their qualitative translation (on a scale from "very bad" to "very good"). This helps the Park's governing body to achieve balance between economic and environmental objectives and allows progress against these objectives to be tracked.

Management of the Sečovelje Salina Nature Park (Slovenia) is monitored by the park's Committee. The Committee evaluates the progress of the park against key performance indicators relevant to the park's goals including preservation of species and habitats, enabling park experiences, achievement of public interest objectives and facilitation of the connection between the local population and the park.

Improving MPA monitoring

Monitoring needs to be programmed in from the point at which MPAs are being considered for designation. Just like environmental monitoring, social and economic monitoring requires a robust baseline (ideally situated before MPA designation) and a committed long-term programme. This is necessary if evidence on the changes (including benefits) induced by MPAs is to be evidenced.

To enable comparability across MPAs and understanding of best practices, some level of

standardisation in monitoring and evaluation would be beneficial. This could be achieved through a broader EU or Member State programme of MPA monitoring and evaluation at site or network level.

Long-term monitoring is essential as many ecological impacts may take years to appear and consequently, any social and economic benefits may only become apparent in the long run. This reinforces the need for long-term investment in monitoring.

Opportunities exist for reducing the cost burden of long-term monitoring, including involving MPA users (such as divers, as already done in some MPAs) and other citizen scientists in data collection. Involving MPA users in monitoring would also support the IUCN recommendation that indigenous/traditional knowledge is more fully captured in MPA management. It may also be an important tool for reducing conflict between the MPA management and MPA users.

New technological solutions, such as unmanned and autonomous vehicles and satellite applications, also provide opportunities for improved social and economic monitoring. For instance, inshore vessel monitoring systems (iVMS) are also being used to observe fishing behaviour around MPAs. In Lyme Bay, inshore VMS has been trialled on fishing vessels under 12m to assess its potential as a management tool, to support surveillance and refine spatial management rules within the MPA.

6.4. MARITIME ECONOMY IN BREST AREA

In November 2018, the *Agence D'urbanisme Brest-Bretagne (Adeupa)*, *CCI Métropolitaine Bretagne Ouest (CCIMBO)* and other local partners published an overview of the Blue Economy sectors and activities in the Brest Area under the title *Maritime Economy in Brest Area*:

What is maritime economy?

Conceptually, the maritime economy comprises all activities linked to the sea. Despite the triviality of this definition, there is still no consensus to design a shared and solid methodology to define this sector. Faced with a multitude of approaches, Brittany's development and urban agencies, and Chambers of Commerce and Industry have collectively built a definition and identification method for a maritime economy.

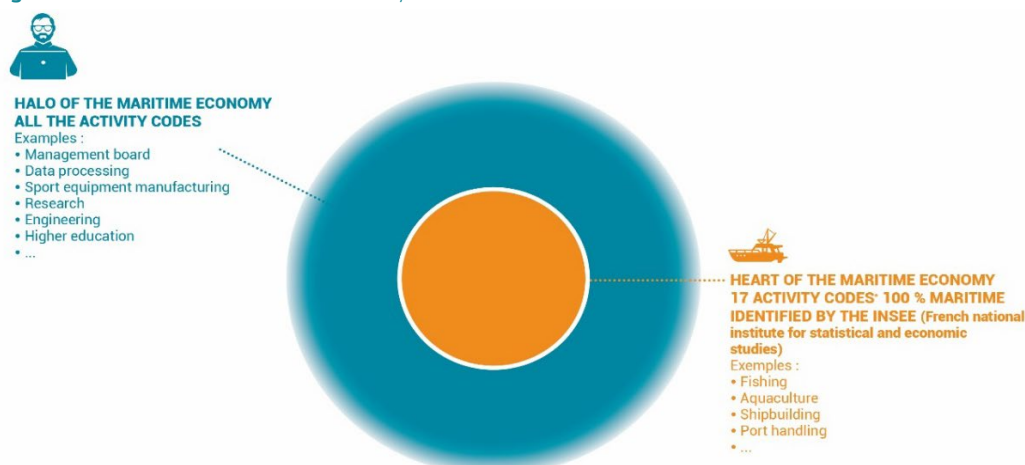
An establishment is qualified as marine if the development of its activity depends on the sea. However, some cases are more complex than others, as it can be difficult to define the degree of dependence. Therefore, it was decided that all the establishments whose sales revenue was dependent on the sea at a minimum level of 25% would belong to the maritime economy.

Once the general definition of this economy is drawn, there remains the complexity of building the nomenclature in order to classify this wide field of activities¹⁴⁰. The cluster of local actors selected these domains below retaining the nomenclature of IFREMER (French Research Institute for Exploitation of the sea):

- Sea-related operations of French military forces
- Ship building, ship repair and maintenance
- Maritime research and higher education
- Seafood products
- Sea transport
- Boating
- Non-seafood products
- Public intervention in the marine field
- Protection of the marine environment and of the littoral
- Cultural and leisure activities
- Maritime energy production
- Oil-related and offshore gas services
- Marine civil engineering
- Submarine cables
- Marine aggregate mining
- Marine insurance

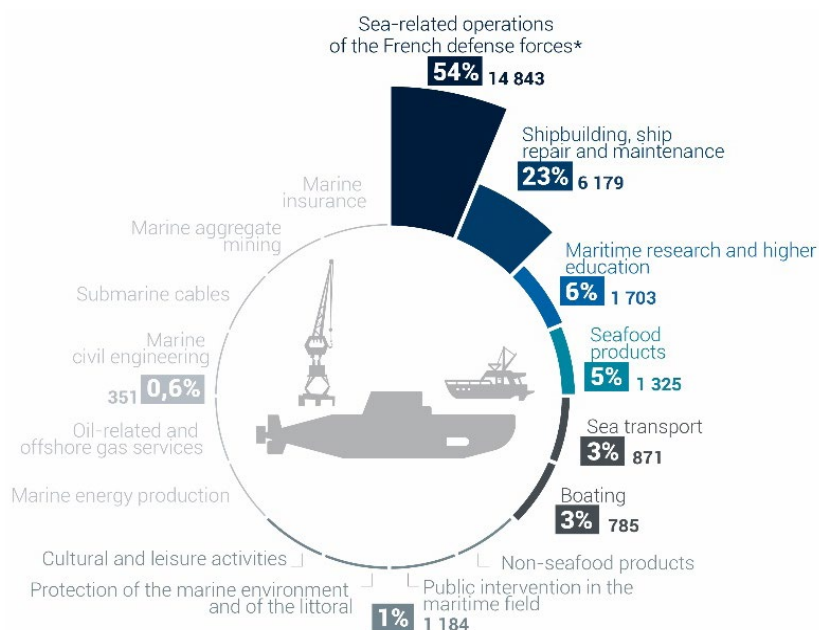
Pays de Brest has 910 public and private organisations falling under the definition of maritime economy. They encompass 27,000 employees, i.e. 16% of the total number of jobs in Brest. The main employer is the Brest-Lorient defence base, providing 15,620 jobs. The defence sector is followed by shipbuilding and repair with 6,180 jobs, and by marine research and education contributing with 1,700 jobs. Together, these three sectors account for these 82% of all maritime jobs in the Brest area (Figure 81).

Figure 80 Sectors in the maritime economy



Source: Network of urban planning agencies and chambers of commerce & industry in Brittany.

140. Tourism is excluded, as its definition would require a specific study.

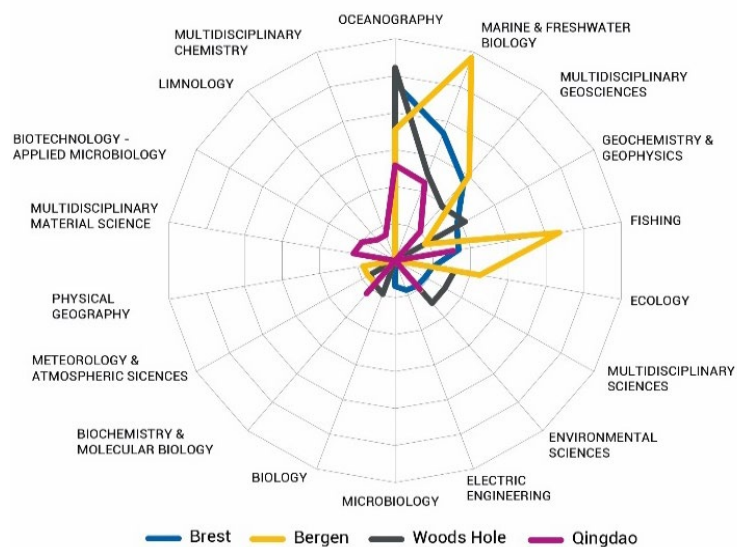
Figure 81 Maritime jobs in Pays de Brest by business sector, 2016

Notes: SHOM and ENSTA are considered under "Research & marine higher education".

Source: Network of urban planning agencies and chambers of commerce & industry in Brittany¹⁴¹.

Figure 82 Marine Science Publication Profile for Brest (France), Woods Hole (US), Bergen (Norway) and Qingdao (China)

Marine Science Publication Profile for Brest (France), Woods Hole (USA), Bergen (Norway) and Qingdao (China)



Source: Charles (2018).

141. Excluding SHOM and ENSTA, considered as "Research & marine higher education".

Higher education and Research

Although sometimes neglected, marine sciences constitute a major asset in Brest. Charles (2018)¹⁴² suggests an interesting approach to take into account the various domains of research within the maritime economy such as oceanography, marine biology, geosciences and others (fishing, aquaculture, marine energies, shipbuilding, information/communication technologies etc.).

The Brest area gathers research units whose main thematic is “sea and coastal”, including 11 units attached to the CNRS (National Centre for Scientific Research), which comprises around 730 researchers and teacher-researchers. The industrial chairs also contribute to the research effort. For instance, the chair of cyber-defence naval systems (*Ecole Navale*, IMT *Atlantique*, Naval Group, Thales), the chair of SPARTE, which deals with submarine acoustics (Ixblue, ENSTA Bretagne). Other examples include the chair of CLAPOT, which explores the use of robots to disarm minefields (ENSTA Bretagne, Thales), and common laboratories: ENSTA *Bretagne* / Naval Group (material fatigue and naval structures), LBCM / Nautix (provide eco-friendly and antifouling solutions).

Beyond these partnerships, several structures and collaborative approaches exist at the sea sciences and technologies’ community level. The Pôle Mer Bretagne Atlantique (Atlantic Brittany marine cluster) and bodies such as the SATT Ouest valorisation in the field of technological transfer; the Research Academic School Isblue (interdisciplinary graduate school for the blue planet), which gathers the academic strengths; and the Campus Mondial de la Mer, which brings together all the marine actors of the territory.

Brest and Roscoff are situated in the heart of a western European area that goes from the Portugal to Norway, remarkable for its concentration of marine research centers. Moreover, western Brittany is characterised by good levels of scientific production. At a worldwide level, Brest-Roscoff is the 17th producer of marine publications.

Education in the marine sector

Approximately 1,600 students study marine related degrees (including the Institut Universitaire Européen de la Mer and *Ecole navale*). Additionally, many graduates with other degrees find jobs in the marine sector (engineering, electronic, logistic, trade, biology, physical, metallurgy, energy, etc.).

142. Charles, K. (2018): Scientific research and economic development of territories, Case study of marine sciences in Western Brittany. UBO.

6.5. THE EUROPEAN INVESTMENT BANK: FINANCIAL SUPPORT FOR BLUE ECONOMY ACTIVITIES

As the EU's lending arm, the European Investment Bank (EIB) plays an important role in helping the public and private sectors build a sustainable Blue Economy.

The EIB has been financing marine projects ever since its creation. In response to global trends and concerns about climate change, overfishing and ocean pollution, Blue Economy projects have grown in importance in the last two decades, and the EIB became more involved in this field. It increased its investments in some of the traditional Blue Economy sectors, such as maritime shipping, but also started investing in emerging sectors, such as offshore wind. The EIB was one of the first lenders to offshore wind projects and has helped fund around 40% of all capacity in the sector in Europe. The EIB also increased lending to research and innovation projects in the Blue Economy.

A recent study on financing for bio-based industries and the Blue Economy¹⁴³ found that projects face many hurdles when accessing private capital. Regulation, market and demand framework conditions are perceived as the most important drivers and incentives, but also present the biggest risks and challenges for both project promoters, as well as financial market participants.

The European Commission, WWF, World Resources Institute and the European Investment Bank helped develop the Sustainable Blue Economy Finance Principles to serve as a guide for investing in the ocean economy in a sustainable way. Started as a commitment by a dozen financial institutions and key stakeholders in 2017, the principles are set to become the gold standard for the sector. With financial support from the European Commission and the EIB, these principles are expected to become in 2019 part of a new sustainable Blue Economy finance initiative under the UN Environment Finance Initiative.

Investing in the established sectors

The EIB finances a broad range of projects in the established sectors of the Blue Economy such as in maritime transport and shipping or fish and seafood production, among others.

Lending to **Maritime transport and shipping** is an important part of EIB's work, amounting to over €7 billion over the last ten years, investing in particular in rehabilitating seaports infrastructure and in developing new ports and associated

facilities. The EIB also finances the European shipping industry, with a focus on green shipping, with the aim is of promoting a shift from other transport modes that cause a lot of pollution, such as road transport. In the last 10 years, the EIB provided about €2 billion to finance 14 shipping projects.

Fish and seafood production is a key contributor to economic growth in Europe's coastal regions. Over the last five years, the EIB provided financing for around €260 million in the sustainable production of seafood in the EU, which includes fisheries, aquaculture and the processing and preserving of seafood. These investments were made in cooperation with local banks and other institutions that offer special financing for small and medium-sized companies. 90% of the funds helped Spanish, Portuguese, Italian, French and Dutch seafood producers, with the largest share going to Spain.

Investing in the emerging sectors

In recent years, the EIB recognised the high potential in a number of emerging sectors, such as offshore wind technology, blue biotechnology and environmental and coastal protection. The EIB has been at the heart of growth in the offshore wind sector. As discussed in Section 4.1, over the last 15 years, offshore wind has grown significantly in the EU. Since 2003, the EIB has signed deals worth about €11 billion for 31 offshore wind farms and offshore transmission projects in Belgium, the Netherlands, Denmark, the UK, Portugal and Germany.

Case studies

Offshore floating wind farm.

The EIB approved a €60 million loan to Windplus, a company that is building a unique offshore floating wind farm using semisubmersible platforms off the northern coast of Portugal, at a depth of 85 to 100 metres. The project will speed up the use of a new technology called WindFloat, which allows the use of wind farms in deep waters, where structures cannot be attached to the sea floor.

The Windplus project comprises three wind turbines that sit on floating platforms anchored to the seabed at a depth of 100 metres. The wind

143. Leoussis, J. and Brzezicka, P. (2017): Study on Access-to-finance conditions for Investments in Bio-Based Industries and the Blue Economy. European Investment Bank and European Commission.

BOX 7 OFFSHORE WIND IN BELGIUM

The EIB played a major role in the growth of the industry in Belgium. It supported all the eight Belgian wind farms developed to date. Four wind farms were helped by the European Fund for Strategic Investment, a programme that allows the EIB to support riskier projects. The EIB has contributed more than €2.5 billion to the sector in the past 10 years.

The EIB also improved onshore transmission grids to ensure that power is delivered smoothly to Belgian households and businesses. The offshore wind sector is a strategic part of Belgium's plan to meet 2020 renewable energy targets.

farm will have a capacity of 27 MW, which can serve 60,000 homes a year.

This is a flagship project in the floating offshore wind sector and contributes to the improvement of the floating platforms industry, a key objective under the European Commission's Strategic Energy Technology Plan.

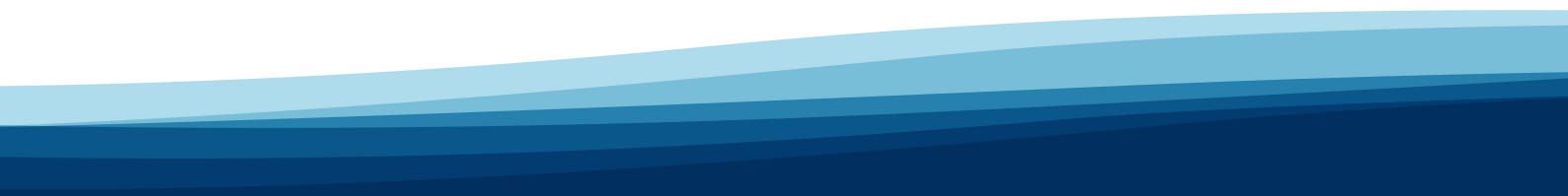
The European Commission is backing this loan under the InnovFin, an initiative launched in the framework of Horizon 2020. The project also will be funded by the EU's NER300 programme, which supports low-carbon demonstration projects, and the Portuguese Carbon Fund¹⁴⁴.

Marine biotechnology in France. The EIB signed a €30 million loan with the Amadéite Group, a French marine biotechnology company that develops algae-based products for animals, plants and humans. Growth in algae can hurt coastal areas, damage the environment and reduce tourism. The company removes algae from beaches and uses it as feed for their production lines. The loan is backed by the European Fund for Strategic Investments.

Coastal protection in Spain. The EIB lent a total of €120 million to the Spanish Ministry of Agriculture, Food and the Environment to support an investment programme for coastal protection (and forestry rehabilitation) between 2013 to 2016. The financing has helped rehabilitate degraded coastal areas and protect the coastline from damage related to waves and flooding. Over 2,000 Km of the coast have been improved, and over 50 hectares of degraded coastal areas have been rehabilitated. Over 200 hectares of exposed beaches will be better protected against rising sea levels and storms, as a result of this investment.

144. A list of other offshore floating wind farm projects can be found in Section 4.2.

CHAPTER 7: **REGIONAL ANALYSIS**



This chapter provides an overview of two important regional aspects of the Blue Economy. On the one hand, a characterisation of the different EU sea basins through their socioeconomic features such as population, GDP and employment. While the report focuses on the EU Blue Economy as a whole and for individual Member States, the Atlantic (and its sub-basins) has many specificities that makes it very different from the Mediterranean (and its sub-basins), also with its own specificities. A better understanding of the main features of each sea basin may help develop policies that better adapt to the problems and particularities of each sea basin.

On the other hand, the Smart Specialisation approach has become a policy driver oriented to discover innovation potential, especially in the emerging sectors of the Blue Economy. The contents developed in the chapter build on examples of EU regions tackling new sectors of the Blue Economy and highlight outcomes of the implementation of Smart Specialisation strategies. These include: (i) the concept of Smart Specialisation as a suitable methodology to enhance territorial strengths and development, (ii) the importance of working in the discovery of innovation potential at subnational levels, (iii) multi-stakeholder governance, (iv) interregional cooperation across EU, (v) the articulation of territorial specialisations in alignment with the value chain approach and (vi) the capacity to integrate funding coming from several sources and combining them strategically. In addition, a case study has been developed giving particular attention to the interregional cooperation exercise for Smart Specialisation in the Marine Renewable Energy sector, and identifying a set of indicators to measure economic the impact of the sector.

7.1. SEA BASINS

Given the specific strengths and weaknesses of each large sea region in the EU, tailor-made strategies have been or are being built for the following sea basin macro-regions: Adriatic and Ionian Seas, Baltic Sea, Black Sea, Mediterranean Sea, Western Mediterranean and the Atlantic.

Notably, a ‘*sea basin strategy*’ means an integrated framework to address common marine and maritime challenges faced by Member States in a sea basin or in one or more sub-sea basins. Sea basin strategies also promote cooperation and coordination in order to achieve economic, social and territorial cohesion. These strategies are developed by the Commission in cooperation with the Member States concerned, their regions and other stakeholders as appropriate (e.g. third countries). Member States may participate in several strategies (e.g. ES, FR and PT participate in both the Atlantic and the West Mediterranean strategies). The strategies encompass existing inter-governmental initiatives and regional bodies and move from political declarations to integrated projects and investments. In turn, some strategies may cover more than one sea basin and in several cases, they may overlap with other strategies (e.g. Western Mediterranean with the Atlantic and the Adriatic and Ionian Seas). For the purpose of this sea basin overview, MSs and concerned NUTS 2016 level 3 regions have been attributed to one or more sea basins (Table 15 and Figure 83 and thereafter).

For Northern waters, the EU has put in place three sea basin strategies: the Atlantic, the North Sea and the Baltic Sea. Note that the UK participates in both the Atlantic and the North Sea strategies and that Germany participates in both the North Sea and the Baltic.

Eight Member States participate in the Mediterranean strategy. Aside from the overall Mediterranean basin, three sub-basin strategies are in place: the West Mediterranean, the East Mediterranean and the Adriatic and Ionian seas. The Black sea has its own differentiated strategy. In these southern waters, the participation of third countries is fundamental.

The analysis of sea basins and coastal regions provides an indication of the overall potential impact of the activities stemming from the sea, going beyond the direct employment and activities. However, there is no perfect correlation between the Blue Economy and the coastal regions. This is because some activities, such as the manufacturing of marine equipment or the provision of insurance¹⁴⁵, may take place far from the coast.

Demography: population

In order to frame the different sea basins, this chapter provides an overview of their main socioeconomic features. In 2017, two fifths of EU’s population (214 million people or 41.8% of EU residents) lived on a coastal region (Table 16). Moreover, 476 million people lived in one of the coastal Member States (i.e. 93% of the 512 million EU inhabitants)¹⁴⁶. While in general coastal regions tend to concentrate more population than non-coastal regions¹⁴⁷, the fact that large capitals and cities such as Madrid, Paris, Berlin or Milan¹⁴⁸ are far from the coast explains, to a certain extent, the almost even distribution of the EU population between coastal and non-coastal regions.

145. Similarly, the headquarters for some important activities such as the extraction of oil and gas or marine energy do not need to be located on the coast.

146. There are five land-locked EU Member States: Luxembourg, Czechia, Slovakia, Austria and Hungary.

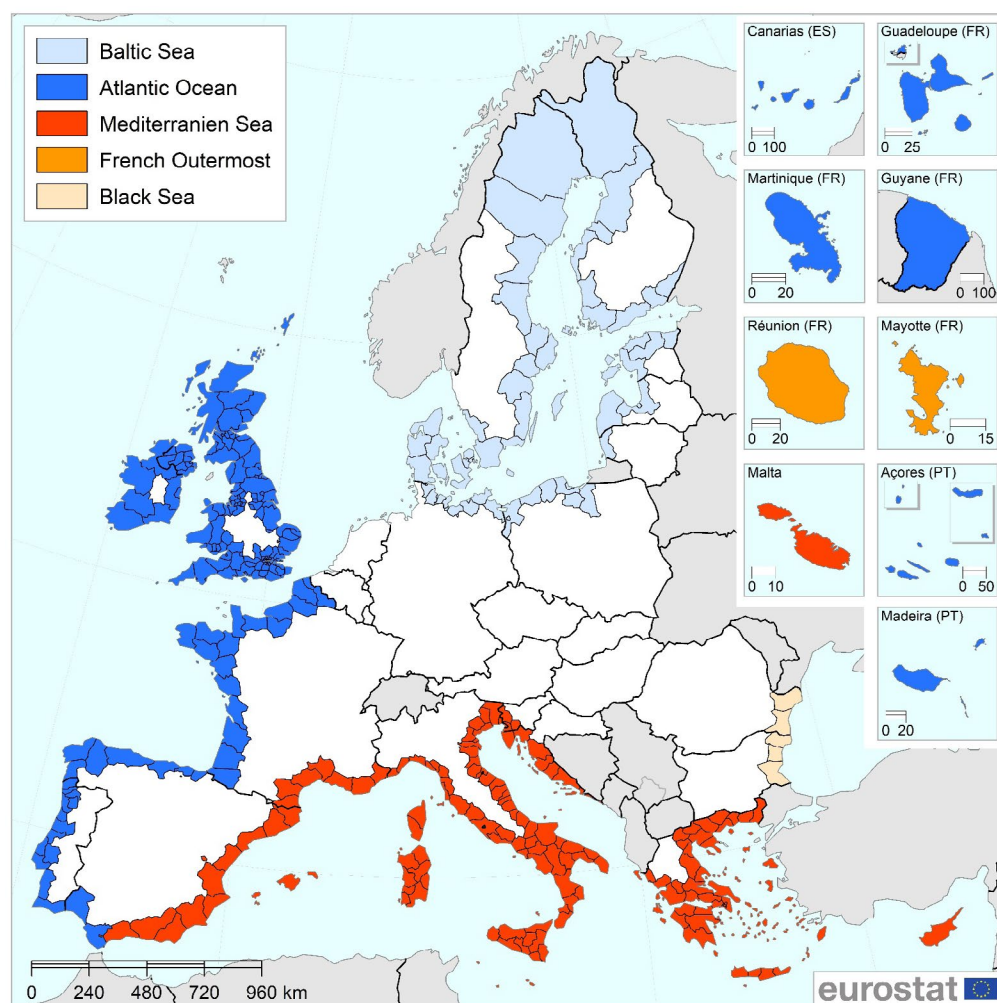
147. Indeed, the area of coastal regions represents 38% of the total EU territory, while population living in those coastal regions represent 45% of overall EU population.

148. London is however considered to be a coastal region.

Table 15 Member States participating in the different sea basins

Atlantic <i>Strategy, Action Plan</i>	North Sea <i>Sea basin</i>	Baltic Sea <i>EU Strategy</i>	Mediterranean <i>Sea basin</i>	West MED <i>Framework for Action</i>	East MED <i>(sub) Sea basin</i>	Adriatic-Ionian <i>EU Strategy</i>	Black Sea <i>Sea basin</i>
ES	BE	DE	CY	ES	CY	EL	BG
FR	DE	DK	EL	FR	EL	HR	RO
IE	NL	EE	ES	IT		IT	
PT	UK	FI	FR	MT		SI	
UK		LT	HR	PT			
		LV	IT				
		PL	MT				
		SE	SI				

Source: Commission Services.

Figure 83 EU regions belonging to each sea basin

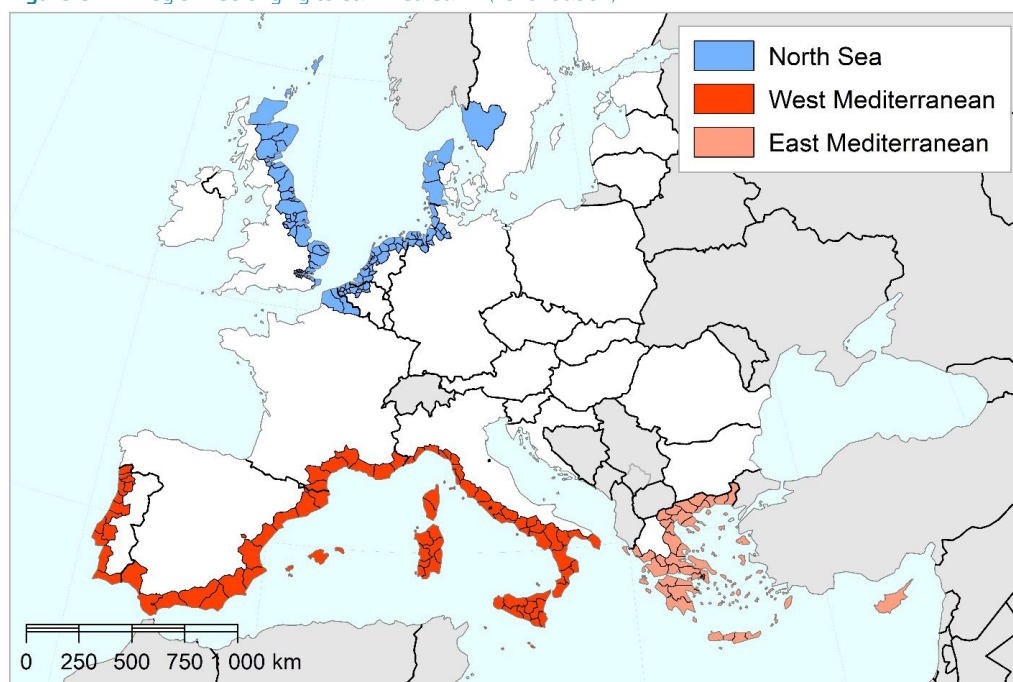
Notes: Classification based on NUTS 2016, level 3. Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat.
Cartography: Eurostat - GISCO, 03/2019.
Source: European Commission.

The Atlantic strategy concerns the life of 92 million EU citizens, who represent 47.5% of the population of those Member States (Spain, France, Ireland, Portugal and the UK) or 18% of EU population. The population living on Mediterranean coasts is slightly smaller (75 million citizens). Within the Mediterranean, 64 million people live on the West Mediterranean, 32 million on the Adriatic or the Ionian Seas and 11 million on the East Mediterranean. A total of almost 20 million people live on the shore of the Baltic Sea. The 2 million people living close to the Black Sea correspond to only 7.3% of the population of Bulgaria and Romania or 0.4% of overall EU population. However, as indicated above, these sea basins provide ecosystem services and other resources to a much wider population when neighbouring countries from the South and the East are taken into account.

Economic activity: Gross Domestic Product

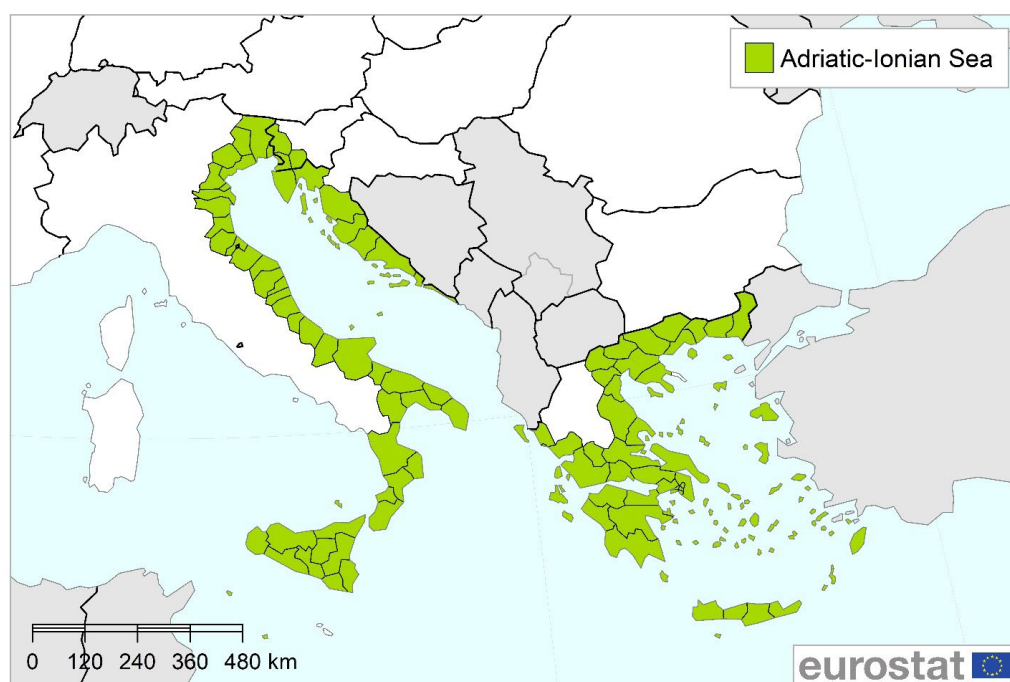
In 2016, EU coastal regions generated almost €6,400 billion of GDP; this represents 42.8% of the overall EU28 GDP (Table 17). Once again, the economic importance of non-coastal regions is driven, to a certain extent, by capitals and cities such as Madrid, Paris, Berlin and Milan, where a significant share of their countries' economic activity is concentrated. The 23 coastal Member States generate 95% of EU GDP. The relative size of each sea basin economy with respect to the Member States or the EU as a whole is similar to the one observed for the distribution of the population. The regions in the Atlantic basin generated almost €3,000 billion or 20% of EU GDP. Regions in the North Sea and the Mediterranean follow with 13% and 11% of EU GDP, respectively.

Figure 84 EU regions belonging to each sea basin (continuation)



Notes: Classification based on NUTS 2016, level 3. Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat.
Cartography: Eurostat - GISCO, 03/2019.
Source: European Commission.

Figure 85 EU regions belonging to each sea basin (continuation)



Notes: Classification based on NUTS 2016, level 3. Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat.
Cartography: Eurostat - GISCO, 03/2019.
Source: European Commission.

Table 16 Population living in coastal regions, 2017

Sea basin	Million people		Share over...	
	Coastal regions	Coastal States	their MS	EU 28
Atlantic	92.4	194.4	47.5%	18.1%
North Sea	47.7	176.8	27.0%	9.3%
Baltic	17.6	147.9	11.9%	3.4%
Mediterranean	74.7	192.4	38.8%	14.6%
West MED	63.7	184.9	34.5%	12.5%
East MED	10.9	11.6	94.2%	2.1%
Adriatic-Ionian	31.5	77.6	40.6%	6.2%
Black Sea	1.9	26.7	7.3%	0.4%
Overall	214.0	476.3	44.9%	41.8%

Note: Regional analysis based on NUTS 3 regions. Some regions may participate in two or three sea basins; therefore, the total cannot be calculated as the sum of the different sea basins.

Source: Eurostat (demo_r_pjangrp3.) and own calculations.

Table 17 GDP of coastal regions, 2016

Sea basin	€ billion		Share over...	
	Coastal regions	Coastal States	their MS	EU 28
Atlantic	2,996.3	6,203.9	48.3%	20.1%
North Sea	1,938.2	6,665.5	29.1%	13.0%
Baltic	558.2	4,613.0	12.1%	3.7%
Mediterranean	1,674.4	5,317.0	31.5%	11.2%
West MED	1,412.3	5,223.0	27.0%	9.5%
East MED	185.7	192.3	96.5%	1.2%
Adriatic-Ionian	622.4	1,941.5	32.1%	4.2%
Black Sea	14.9	217.9	6.8%	0.1%
Overall	6,384.1	14,130.1	45.2%	42.8%

Note: Regional analysis based on NUTS 3 regions. Some regions may participate in two or three sea basins; therefore, the total cannot be calculated as the sum of the different sea basins. When data for 2016 was not available, data for 2015 were used as a proxy. In a few cases, the most recent available data correspond to 2014.

Source: Eurostat (nama_10r_3gdp) and own calculations.

Regions from Northern countries tend to have higher GDP per capita (Table 18). This is particularly the case for regions on the North Sea, with an average of €40,700 of GDP per capita or 139% of EU average. The regions in the Baltic Sea also have an income above the EU average (109%) as well as the ones on the Atlantic (111%). On the other hand, Southern regions present lower income levels, for instance, average GDP per capita for all Mediterranean regions was 77% of the EU average. This is particularly the case for regions on the Black Sea coast (with a GDP per capita of €7,700 or 26% of the EU average). When the economies are compared in terms of purchasing parity, the disparities North-South narrows down.

In the Northern basins, coastal regions have a higher GDP per capita than their country average while in the Mediterranean and Black sea we observed the contrary. For instance, the GDP per capita for the Member States of the North Sea was €37,700 while the GDP per capita of their coastal regions was €40,700. On the other hand, Mediterranean coastal regions have a lower GDP per capita (€22,400) than the averages for their Member States (€27,600)

Labour market: Employed persons

In 2016, the workforce of EU coastal regions amounted to 92 million people (Table 19). This represents almost 40% of the total EU workforce (232 million people). Compared to the estimated 4 million people employed in the Blue Economy in the EU, the direct employment linked to the Blue Economy represents 4.5% of the employment in coastal regions. Once again, it is in the Atlantic regions where the largest share (41.3 million employees or 17.8% of the EU total) is concentrated, followed by the Mediterranean (12.3% of the EU workforce) and the North Sea (10%).

Table 18 GDP per capita of coastal regions, 2016

Sea basin	€		Compared to EU average	
	Nominal	In PPS	Nominal	In PPS
Atlantic	32,400	29,700	111.0%	101.7%
North Sea	40,700	35,900	139.4%	122.9%
Baltic	31,700	29,100	108.6%	99.7%
Mediterranean	22,400	23,800	76.7%	81.5%
West MED	22,200	23,800	76.0%	81.5%
East MED	17,000	20,800	58.2%	71.2%
Adriatic-Ionian	19,700	21,500	67.5%	73.6%
Black Sea	7,700	15,700	26.4%	53.8%
Overall	29,800	28,400	102.1%	97.3%

Note: Regional analysis based on NUTS 3 regions. Some regions may participate in two or three sea basins; therefore, the total cannot be calculated as the sum of the different sea basins. When data for 2016 was not available, data for 2015 were used as a proxy. In a few cases, the most recent available data correspond to 2014.

Source: Eurostat (nama_10r_3gdp) and own calculations.

Table 19 Employed persons, 2016

Sea basin	Thousand people		Share over...	
	Coastal regions	Coastal States	their MS	EU 28
Atlantic	41,351	85,076	48.6%	17.8%
North Sea	23,418	88,977	26.3%	10.1%
Baltic	8,342	72,855	11.5%	3.6%
Mediterranean	28,466	77,035	37.0%	12.3%
West MED	24,398	76,263	32.0%	10.5%
East MED	4,207	4,463	94.3%	1.8%
Adriatic-Ionian	11,587	29,852	38.8%	5.0%
Black Sea	836	11,912	7.0%	0.4%
Overall	91,959	213,837	43.0%	39.6%

Note: Regional analysis based on NUTS 3 regions. Some regions may participate in two or three sea basins; therefore, the total cannot be calculated as the sum of the different sea basins. When data for 2016 was not available, data for 2015 were used as a proxy. In a few cases, the most recent available data correspond to 2014.

Source: Eurostat (nama_10r_3empers) and own calculations.

7.2. SMART SPECIALISATION IN THE BLUE ECONOMY

Defining Smart Specialisation

Smart Specialisation is an innovative place-based policy approach that aims to boost growth and jobs at regional, national and European levels. It enables the identification and development of competitive advantages by concentrating efforts and resources in the identification of innovation niches. Smart Specialisation advocates for the conjugation of economic, innovative and scientific potential of a territory responding thus, to societal challenges.

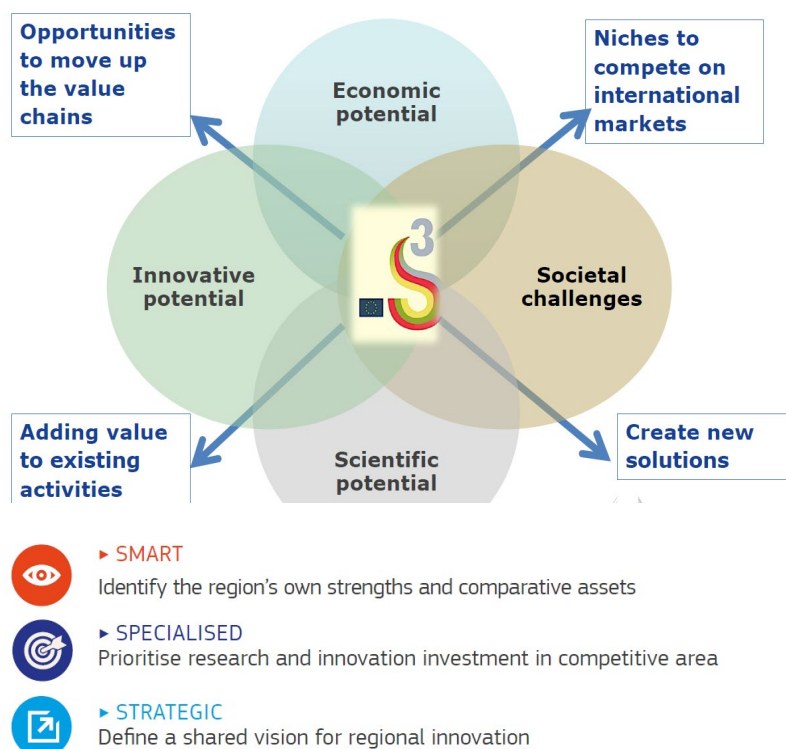
In the European Union, over the last 5 years, more than 120 Smart Specialisation Strategies have been designed and implemented by Member States and regions. Financially, these strategies have been supported with more than €67 billion available under the European Regional Development Fund (ERDF) and topped-up by national and regional public and private funding. Smart Specialisation promotes interregional and cross-border partnerships in innovative areas such as renewable energies, industrial modernisation and agri-food supported by the respective Thematic Smart Specialisation Platforms on

Energy, Industrial Modernisation and Agri-Food. Expected achievements by 2020 include bringing 15,000 new products and services to the market, creating 140,000 new start-ups and 350,000 new jobs.

The role of Smart Specialisation in the emerging sectors of the Blue Economy

When addressing emerging sectors of the blue economy, a big concern remains in the scarce level of information and/or absence of statistical data, standardised indicators and other tools useful to measure economic and innovation impact. The characteristics and principles of the Smart Specialisation approach help to strengthen economic competitiveness through an inclusive participatory process leading to discover and promote the previously untapped innovation potential and facilitate its market potentials. This approach instigates knowledge exchange among several stakeholders eager to conceive more details and data to support and instruct smart, sustainable, socially effective evidence based

Figure 86 Smart Specialisation concept



Source: Joint Research Centre, Smart Specialisation Platform

regional innovation priorities linked to territorial specificities. Regarding the blue economy, some regional specialisations target interesting activities of blue economy emerging sector specialisations as follows:

- **Marine biotechnology, a sector with innovation potential. Brittany (FR).** Marine Biotechnology focused on macro and micro-algae, invertebrates, bacteria and viruses constitutes one of the innovation priorities for Brittany. The Smart Specialisation Strategy of this region identifies the potential in industries operating in the domains of food, health, cosmetics, biofuels and green chemistry. The strategy has also identified the close connection between research in this area and the development of new business models of Marine living resources, mostly fisheries and fish farms.
- **The added value of universities to support innovation niches of the Blue Economy. Canary Islands (ES).** The Smart Specialisation strategy of this Spanish archipelago recognises the added-value of universities. A relevant role for supporting the innovation of regional economy is attributed to the local network of Universities and research centres, each covering a specialisation across a wide range of innovation areas. Applied research and technical platforms to test specific solutions are essential in the region to promote innovation in mature sectors (e.g. tourism and shipbuilding) and to position the region within innovative niches with high potentials (e.g. ocean energy), through international strategic partnerships with research centres and industries. The local cluster also plays a strategic role, acting as a bridge between enterprises and research.
- **Policy coherence and synergies between national and regional levels of administration. Ireland.** Ireland has promoted a reorganisation of administrative structures at regional level, as means to respond more effectively in the innovative sectors identified as priorities of Smart Specialisation. A marine coordination group has been established with senior officials from a range of relevant Departments from the Central Governments and the pertinent agencies. Regional Assemblies are functioning as a bridge between national policies and regional needs, so as to ensure that local priorities and specifications (comprised those regarding blue growth) are respected in the implementation of the central government actions. Most importantly, a network of brokers has been set up to engage with local

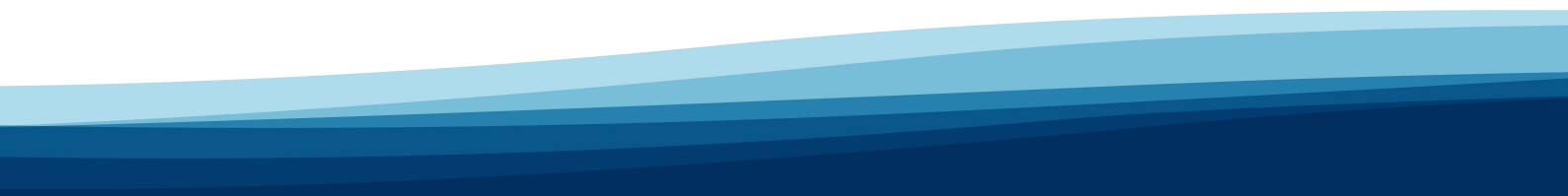
entrepreneurs and other economic actors, to ensure their understanding of administrative functioning and to identify potential interesting project to be funded¹⁴⁹.

- **Interregional cooperation and value Nets. Portugal Centro (PT).** The development of value chains associated with the natural endogenous resources in marine environments is a specific domain of specialisation included in the regional strategy of Portugal Centro region. Conservation and sustainable monitoring of these natural resources as well as the development of new products and services constitute innovation niches aiming at reinvigorating economic development. These priorities are also synergised with a regional innovation hub on endogenous resources, which combines expertise from different entities and stakeholders¹⁵⁰. Nation-wide, Portugal has mapped the existing networks of knowledge creation and exchange in the country through an assessment of themes covered by local nodes and their integration, including Blue Economy.

149. De Vet J-M, Edwards J., Bocci M. (2016), Blue Growth and Smart Specialisation: How to catch maritime growth through 'Value Nets', S3 Policy Brief Series No. 17/2016.

150. Official website Smart Specialisation Region Portugal Centro, RISC3NTRO, Innovation for a better future.

CHAPTER 8: **MEMBER STATE PROFILES**



The following chapter provides an overview of the Blue Economy in the individual Member States. It does not include the emerging sectors and focuses purely on the established ones, as this ensures a comparable analysis across all the MS. There is a brief description specific to each and every MS, which is complemented by two tables, the first illustrates the evolution of the Blue Economy for the six established sectors in terms of employment and GVA, and the second shows an overview of the Blue Economy by sub-sector and activity for employment, GVA and turnover.

BELGIUM

Belgium's Blue Economy provides around 27,625 jobs and generates almost €3.6 billion in GVA.

Ports, warehousing and water projects represented 41% of Blue Economy jobs and 44% of GVA in 2017. Living resources and coastal tourism are also important generators of employment while Maritime transport is a key contributor to GVA (31%).

The contribution of the Blue Economy to the national economy is negligible at 0.81%, but has been on the rise since 2009, outperforming the national economy in terms of GVA. Overall, GVA increased 29% compared to 2009. In terms of jobs, the Blue Economy's share, at 0.60% in 2017, up 4% compared to 2009.

Belgium: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	6.4	5.8	5.6	5.4	5.6	5.7	5.6	6.3	5.6
Marine living resources	5.4	5.6	6.5	6.9	6.6	6.1	6.4	6.6	6.6
Marine non-living resources	0.6	0.7	0.6	0.5	0.7	0.6	0.6	0.6	0.6
Port activities	9.9	10.4	10.0	10.5	10.1	10.6	10.9	11.2	11.2
Shipbuilding and repair	2.9	1.9	1.8	1.8	1.7	1.6	1.5	1.4	1.4
Maritime transport	1.2	1.4	1.5	2.3	2.7	1.9	2.3	2.2	2.2
Blue economy	26.5	25.8	26.0	27.4	27.3	26.4	27.3	28.4	27.6
<i>National employment</i>	<i>4,389</i>	<i>4,451</i>	<i>4,470</i>	<i>4,479</i>	<i>4,485</i>	<i>4,497</i>	<i>4,499</i>	<i>4,541</i>	<i>4,587</i>
Blue economy (% of national jobs)	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	294	258	257	251	281	279	275	311	270
Marine living resources	344	413	396	413	405	399	427	441	435
Marine non-living resources	95	110	74	41	87	78	81	94	94
Port activities	1,531	1,565	1,429	1,605	1,621	1,561	1,886	1,566	1,566
Shipbuilding and repair	219	160	177	109	96	86	26	106	97
Maritime transport	288	316	367	838	706	658	1,102	1,109	1,109
Blue economy	2,770	2,822	2,700	3,257	3,197	3,061	3,796	3,627	3,570
<i>National GVA (EUR billion)</i>	<i>312.6</i>	<i>326.5</i>	<i>339.6</i>	<i>346.7</i>	<i>350.9</i>	<i>358.1</i>	<i>368.1</i>	<i>379.3</i>	<i>391.9</i>
Blue economy (% of GVA)	0.9%	0.9%	0.8%	0.9%	0.9%	0.9%	1.0%	1.0%	0.9%

Source: Eurostat, DCF and own calculations.

Belgium: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	3.1	2.7	289	281	132	125	64.3	79.0	27.4	27.1
	Transport	Transport	1.8	1.4	292	363	114	94	72.3	77.6	48.8	54.2
	Other expenditure	Other expenditure	1.5	1.5	215	224	48	50	71.2	68.6	16.4	19.3
Extraction and commercialization of marine living resources	Capture fisheries	Small-scale coastal fleet	0.4	0.3	77	88	30	47	98.0	211.9	60.6	86.7
		Industrial fleet										
		Finfish marine aquaculture										
		Shellfish aquaculture										
		Freshwater aquaculture	0.0	0.0	2	0	1	0	45.6	43.4	15.9	14.0
		Processing and preserving of fish, crustaceans and molluscs	1.0	1.3	443	677	76	106	83.7	99.2	42.0	46.8
		Retail sale of fish, crustaceans and molluscs in specialised stores	1.0	1.1	153	211	33	38	118.5	95.7	8.3	12.2
		Wholesale of other food, including fish, crustaceans and molluscs	2.3	2.9	1,693	2,181	150	182	91.3	87.1	42.8	41.6
	Processing and distribution	Prepared meals and dishes	0.7	1.0	240	239	55	62	85.0	76.8	43.4	41.2
		Manufacture of oils and fats										
Marine extraction of minerals, oil and gas		Other food products	0.0	0.0	2	2	0	1	99.5	146.6	62.5	60.5
		Extraction of crude petroleum										
	Extraction	Extraction of natural gas										
		Operation of gravel and sand pits; mining of clays and kaolin	0.5	0.6	263	304	86	94	194.1	182.1	62.6	78.4
		Support activities for petroleum and natural gas extraction										
	Support activities	Support activities for other mining and quarrying	0.1	0.0	35	1	8	0	120.3	40.0	40.4	10.0
		Sea and coastal passenger water transport	0.3	0.3	548	548	57	57	240.2	240.2	116.0	116.0
		Sea and coastal freight water transport	0.2	0.9	823	2,415	148	805	882.7	1,075.0	47.1	104.4
	Inland water transport	Inland freight water transport	0.4	0.7	153	172	41	68	234.1	190.1	26.0	25.6
		Inland passenger water transport	0.2	0.2	78	47	18	18	186.3	152.2	27.6	25.6
Ports, warehousing and construction of water projects	Renting	Renting and leasing of water transport equipment	0.1	0.1	136	261	24	161	442.6	2,681.7	62.8	34.1
		Cargo handling	1.5	1.3	665	621	309	183	237.0	168.5	143.1	52.2
		Warehousing and storage	1.0	2.4	237	620	95	192	105.6	92.8	48.3	49.6
	Water projects	Construction of water projects	2.5	3.7	1,351	3,141	275	547	125.7	173.8	65.8	96.0
	Service activities	Service activities incidental to water transportation	4.9	3.8	1,131	1,577	852	644	186.4	182.2	63.5	80.5
		Building of ships and floating structures	0.1	0.1	21	24	7	7	70.2	69.3	46.8	50.9
		Building of pleasure and sporting boats	0.0	0.0	3	1	1	0	66.7	50.0	19.2	6.7
	Repair	Repair and maintenance of ships and boats	1.7	1.0	226	215	95	67	65.6	95.4	47.5	51.9
		Manufacture of cordage, rope, twine and netting	0.0	0.0	0	0	0	0	80.1	72.7	38.1	42.1
	Equipment	Manufacture of textiles other than apparel	0.0	0.1	1	18	0	4	55.3	75.2	30.9	30.9
Shipbuilding and repair		Manufacture of sport goods	0.0	0.0	1	0	0	0	67.3	133.3	19.4	10.8
		Manufacture of engines and turbines, except aircraft	1.1	0.1	647	37	116	15	123.3	180.1	68.0	70.3
	Machinery	Manufacture of instruments for measuring, testing and navigation	0.0	0.0	5	10	1	3	82.9	123.8	57.1	66.9
Total Blue Economy			26.5	27.6	9,730	14,280	2,770	3,570	133.2	170.3	52.9	56.6

Source: Eurostat (SBS), DCF and own calculations.

BULGARIA

The Bulgarian Blue Economy employs 72,857 people and generates around €732 million in GVA.

Coastal tourism contributed 66% to Blue Economy jobs and 55% to GVA in 2017. Shipbuilding and repair, extraction of marine living and extraction of non-living resources are also important generators to GVA (around 10% each).

The contribution of the Blue Economy to the national economy in terms of GVA is around 1.4%, a slight decrease compared to 2009. Overall, GVA increased 32% compared to 2009, underperforming compared to the 38% of the national economy. In terms of jobs, the Blue Economy's share, at 2.4% in 2017, declined 1% compared to 2009.

Bulgaria: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	48.5	48.1	44.0	40.7	37.5	36.3	32.6	43.1	48.3
Marine living resources	7.7	8.0	7.8	7.7	7.9	7.8	8.1	8.6	8.5
Marine non-living resources	4.6	3.6	3.3	3.1	3.2	3.1	4.4	4.2	4.2
Port activities	7.2	5.9	5.0	4.8	4.0	5.5	5.8	4.7	4.7
Shipbuilding and repair	6.9	6.2	5.7	5.1	4.9	4.9	5.1	5.5	5.4
Maritime transport	1.8	1.8	1.7	1.7	1.4	1.7	1.6	1.7	1.7
Blue economy	76.7	73.6	67.5	63.1	58.9	59.3	57.6	67.9	72.9
<i>National employment</i>	<i>3,205</i>	<i>3,037</i>	<i>2,928</i>	<i>2,895</i>	<i>2,889</i>	<i>2,927</i>	<i>2,974</i>	<i>2,954</i>	<i>3,073</i>
Blue economy (% of national jobs)	2.4%	2.4%	2.3%	2.2%	2.0%	2.0%	1.9%	2.3%	2.4%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	229	232	228	248	250	226	230	363	399
Marine living resources	47	49	54	61	62	60	67	75	75
Marine non-living resources	60	44	77	79	60	62	84	83	83
Port activities	120	109	81	72	67	86	102	68	68
Shipbuilding and repair	63	46	38	48	62	66	52	76	75
Maritime transport	34	33	35	36	36	25	28	32	32
Blue economy	553	513	512	544	536	525	563	698	732
<i>National GVA (EUR billion)</i>	<i>32.4</i>	<i>33.2</i>	<i>36.1</i>	<i>36.3</i>	<i>36.0</i>	<i>37.2</i>	<i>39.1</i>	<i>41.5</i>	<i>44.8</i>
Blue economy (% of GVA)	1.7%	1.5%	1.4%	1.5%	1.5%	1.4%	1.4%	1.7%	1.6%

Source: Eurostat, DCF and own calculations.

Bulgaria: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accomodation	Accommodation	23.7	26.1	349	578	145	273	6.7	11.8	3.1	4.8
	Transport	Transport	3.2	3.4	200	260	24	38	7.8	11.7	5.1	6.7
	Other expenditure	Other expenditure	21.6	18.8	332	447	61	89	4.0	6.8	1.8	3.0
	Capture fisheries	Small-scale coastal fleet	1.0	1.3	3	2	2	1	6.4	2.9	1.2	0.6
Extraction and commercialization of marine living resources		Industrial fleet	0.2	0.2	4	3	2	2	12.0	12.7	3.0	4.3
		Finfish marine aquaculture										
	Aquaculture	Shellfish aquaculture	0.0	0.1	0	1	0	1	14.9	12.8	2.7	2.6
		Freshwater aquaculture	0.3	1.0	8	21	6	10	19.9	11.8	1.9	2.1
		Processing and preserving of fish, crustaceans and molluscs	1.5	1.6	30	63	7	16	5.3	10.1	2.3	4.4
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.8	0.9	11	25	2	3	3.3	5.4	1.3	2.1
	Processing and distribution	Wholesale of other food, including fish, crustaceans and molluscs	3.5	3.4	316	380	26	42	8.5	14.4	3.5	6.2
		Prepared meals and dishes	0.4	0.0	8	1	2	0	4.2	6.2	2.9	4.3
		Manufacture of oils and fats										
		Other food products										
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum			8	8	2	4				
		Extraction of natural gas	0.0	0.0	1	8	2	7	104.5	297.8	38.3	38.2
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	4.5	3.9	138	170	54	70	13.0	19.1	4.8	7.5
		Support activities for petroleum and natural gas extraction	0.0	0.0	1	0	0	1	40.0	-	129.4	16.7
		Support activities for other mining and quarrying	0.2	0.3	5	14	2	4	13.1	12.4	6.0	9.3
Maritime transport	Sea and coastal water transport	Sea and coastal passenger water transport	0.1	0.2	1	3	0	2	2.9	11.3	5.0	8.9
		Sea and coastal freight water transport	0.6	0.5	55	37	20	14	35.4	27.1	14.8	14.8
	Inland water transport	Inland freight water transport	1.1	0.6	52	31	13	9	12.5	15.4	5.4	6.9
		Inland passenger water transport		0.3		17		6		19.2		5.2
	Renting	Renting and leasing of water transport equipment	0.0	0.0	1	2	1	1	44.4	72.2	3.7	2.1
Ports, warehousing and construction of water projects	Cargo and warehousing	Cargo handling	0.6	0.5	9	18	5	10	8.8	19.5	7.1	10.0
		Warehousing and storage	0.2	0.3	7	10	3	4	15.3	15.6	6.2	7.8
	Water projects	Construction of water projects	4.9	2.8	281	118	71	33	15.2	12.5	6.1	5.1
	Service activities	Service activities incidental to water transportation	1.4	1.1	75	54	41	21			9.1	11.1
Shipbuilding and repair	Building of ships	Building of ships and floating structures	2.5	0.6	79	24	15	8	5.9	12.4	5.7	7.0
		Building of pleasure and sporting boats	0.1	0.0	1	1					3.4	3.0
	Repair	Repair and maintenance of ships and boats	4.2	4.5	85	140	48	65	11.8	14.9	6.2	9.0
	Equipment	Manufacture of cordage, rope, twine and netting	0.0	0.0	0	0	0	0	3.9	6.1	2.2	3.3
		Manufacture of textiles other than apparel	0.0	0.0	0	0	0	0	5.5	10.0	2.6	4.6
	Machinery	Manufacture of sport goods	0.1	0.2	3	7	1	2	8.4	14.4	4.8	8.5
	Manufacture of engines and turbines, except aircraft	0.0	0.0	1	0	0	0	7.2	10.1	3.7	7.6	
Total Blue Economy		Manufacture of instruments for measuring, testing and navigation	0.0	0.0	0	1	0	0	9.6	22.7	4.1	7.8
			76.7	72.9	2,063	2,443	553	732	7.9	11.8	3.6	5.0

Source: Eurostat (SBS), DCF and own calculations.

CZECHIA

As the Czechia is a landlocked country, the Blue Economy is not a major contributor to its economy as a whole (around 0.17%), and this has decreased in recent years (2014-2017). On a positive note however, the opposite trend has occurred for employment, for which the Blue Economy's share increased by 26% between 2009 and 2017.

Czechia: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism									
Marine living resources	1.1	1.7	1.7	1.9	1.7	1.9	1.6	1.6	1.6
Marine non-living resources	1.7	1.7	1.8	1.8	1.7	1.6	1.6	1.6	1.6
Port activities	4.6	4.9	5.3	5.8	5.6	5.4	5.8	6.4	6.4
Shipbuilding and repair	1.4	2.4	1.9	1.9	1.9	2.4	2.2	2.4	2.3
Maritime transport	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Blue economy	9.4	11.4	11.3	11.9	11.5	12.0	11.8	12.5	12.5
National employment	4,857	4,810	4,796	4,810	4,846	4,883	4,934	5,016	5,094
Blue economy (% of national jobs)	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism									
Marine living resources	24	36	34	34	34	33	33	36	36
Marine non-living resources	30	30	30	30	30	30	30	30	30
Port activities	224	224	223	233	226	184	195	200	200
Shipbuilding and repair	27	67	45	52	53	59	59	54	51
Maritime transport	8	7	9	8	7	8	8	8	8
Blue economy	312	364	340	355	350	314	324	327	324
National GVA (EUR billion)	134.4	141.7	148.0	145.1	141.2	141.6	151.6	158.5	172.0
Blue economy (% of GVA)	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%

Source: Eurostat, DCF and own calculations.

Czechia: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation										
	Transport	Transport										
	Other expenditure	Other expenditure										
	Capture fisheries	Small-scale coastal fleet										
Extraction and commercialization of marine living resources	Aquaculture	Industrial fleet										
		Finfish marine aquaculture										
		Shellfish aquaculture										
	Processing and distribution	Freshwater aquaculture	0.3	0.5	43	43	11	14	45.8	44.3	16.1	13.4
		Processing and preserving of fish, crustaceans and molluscs	0.4	0.8	41	86	5	15	14.1	19.8	8.2	13.0
		Retail sale of fish, crustaceans and molluscs in specialised stores										
		Wholesale of other food, including fish, crustaceans and molluscs										
	Support activities	Prepared meals and dishes	0.4	0.3	27	25	8	7	21.6	22.3	10.1	11.6
		Manufacture of oils and fats										
		Other food products	0.0	0.0	3	2	1	0	22.5	25.0	10.8	11.7
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum										
		Extraction of natural gas										
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin										
		Support activities for petroleum and natural gas extraction										
Maritime transport	Sea and coastal water transport	Support activities for other mining and quarrying	1.7	1.6	87	87	30	30	17.7	18.7	14.6	13.8
		Sea and coastal passenger water transport										
	Inland water transport	Sea and coastal freight water transport										
		Inland freight water transport	0.4	0.3	35	25	5	5	11.5	19.2	12.7	11.2
	Renting	Inland passenger water transport	0.3	0.3	11	11	3	3	15.5	15.5	7.7	7.7
		Renting and leasing of water transport equipment										
Ports, warehousing and construction of water projects	Cargo and warehousing	Cargo handling										
		Warehousing and storage	4.6	6.4	1,589	1,275	224	200	51.9	33.6	14.6	15.5
	Service activities	Construction of water projects										
		Service activities incidental to water transportation										
Shipbuilding and repair	Building of ships	Building of ships and floating structures	0.2	0.2	14	12	2	3	13.0	16.7	6.8	7.1
		Building of pleasure and sporting boats	0.1	0.1	5	5	1	1	21.2	20.7	9.1	10.0
	Repair	Repair and maintenance of ships and boats	0.1	0.0	2	3	1	0	24.0	25.0	4.0	4.4
		Manufacture of cordage, rope, twine and netting	0.0	0.0	0	0	0	0	20.4	21.2	11.4	12.8
	Equipment	Manufacture of textiles other than apparel	0.7	0.9	30	42	8	11	14.6	15.3	8.7	9.2
		Manufacture of sport goods	0.1	0.3	3	15	1	6	20.0	22.4	10.0	12.1
Machinery	Manufacture of engines and turbines, except aircraft	Manufacture of engines and turbines, except aircraft	0.2	0.1	30	16	11	5	50.6	35.9	21.4	22.5
		Manufacture of instruments for measuring, testing and navigation	0.1	0.6	14	111	3	25	42.3	40.9	17.9	18.5
Total Blue Economy			9.4	12.5	1,934	1,758	312	324	36.0	28.6	13.4	14.2
Source: Eurostat (SBS), DCF and own calculations.												

Source: Eurostat (SBS), DCF and own calculations.

DENMARK

The Blue Economy's share in Denmark's national GDP was at its highest in 2011 (5.0%) over the reporting period. It has decreased since and is currently at slightly over 3.3%.

For employment, by contrast, a different pattern can be observed. For the period analysed, the share of employment provided by the Blue Economy (around 4.3%), has grown by 45% compared to 2009.

The Blue Economy employs over 117,500 people and generates around €9.8 billion in GVA. It is dominated by coastal tourism in terms of jobs, contributing 67% of the total Blue Economy jobs in 2017.

In terms of GVA and profits, the contribution is more evenly distributed, with marine extraction of oil and gas contributing 17% to GVA, Maritime transport 29% to GVA and coastal tourism 33% of the GVA.

The average wage in the Blue Economy in 2017 was €43,600, a 3% decrease on the €45,000 reported in 2009. This decrease is mainly driven by the decrease in the Shipbuilding and support activities for mining sectors.

Denmark: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	41.9	43.7	35.5	34.6	43.9	50.6	51.6	58.1	58.1
Marine living resources	8.6	8.1	8.5	8.8	8.7	8.7	8.7	8.4	8.2
Marine non-living resources	3.2	3.1	3.6	5.3	3.9	3.9	3.5	3.0	3.0
Port activities	3.4	3.3	4.0	4.3	5.5	5.9	5.7	5.4	5.4
Shipbuilding and repair	4.4	4.2	4.2	3.4	3.2	3.6	3.6	3.2	3.2
Maritime transport	18.9	18.4	19.6	21.3	21.3	22.0	22.5	19.4	19.4
Blue economy	80.5	80.8	75.4	77.6	86.5	94.7	95.6	97.5	97.3
<i>National employment</i>	<i>2,724</i>	<i>2,654</i>	<i>2,643</i>	<i>2,621</i>	<i>2,622</i>	<i>2,640</i>	<i>2,678</i>	<i>2,748</i>	<i>2,734</i>
Blue economy (% of national jobs)	3.0%	3.0%	2.9%	3.0%	3.3%	3.6%	3.6%	3.5%	3.6%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	1,652	1,705	1,736	1,760	2,291	2,614	2,674	2,517	2,517
Marine living resources	645	749	712	682	698	733	834	862	899
Marine non-living resources	5,236	6,170	6,964	6,262	5,504	4,217	4,210	1,678	1,678
Port activities	390	385	403	428	637	604	593	706	706
Shipbuilding and repair	286	266	273	197	197	236	255	279	279
Maritime transport	2,222	2,199	2,252	2,016	2,946	3,508	4,312	2,805	2,805
Blue economy	10,431	11,472	12,340	11,345	12,272	11,912	12,878	8,849	8,884
<i>National GVA (EUR billion)</i>	<i>199.4</i>	<i>209.8</i>	<i>213.9</i>	<i>219.8</i>	<i>223.9</i>	<i>230.6</i>	<i>236.9</i>	<i>244.7</i>	<i>254.5</i>
Blue economy (% of GVA)	5.2%	5.5%	5.8%	5.2%	5.5%	5.2%	5.4%	3.6%	3.5%

Source: Eurostat, DCF and own calculations.

Denmark: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	19.9	23.8	1,751	2,498	742	1,061	59.1	77.5	28.7	28.8
	Transport	Transport	8.1	9.8	1,849	2,517	503	769	77.1	102.8	50.3	54.0
	Other expenditure	Other expenditure	13.9	24.5	1,390	2,211	407	687	54.6	57.9	22.1	21.5
	Capture fisheries	Small-scale coastal fleet	0.4	0.3	25	23	12	10	38.6	49.3	8.2	8.1
Extraction and commercialization of marine living resources	Aquaculture	Industrial fleet	1.3	1.0	293	516	175	371	114.1	214.4	53.5	100.8
		Finfish marine aquaculture	0.1	0.2	43	63	4	15	65.7	145.6	33.2	35.1
		Shellfish aquaculture	0.0	0.0	2	1	1	1	41.3	112.9	30.0	36.0
	Processing and distribution	Freshwater aquaculture	0.4	0.4	96	125	24	30	98.8	114.1	33.3	35.2
		Processing and preserving of fish, crustaceans and molluscs	4.2	3.7	1,668	2,639	280	257	79.9	82.3	46.3	52.8
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.8	0.9	82	97	23	29	57.1	59.1	18.9	24.3
		Wholesale of other food, including fish, crustaceans and molluscs	1.4	1.8	1,320	1,781	114	178	98.7	127.7	49.4	51.6
	Processing and distribution	Prepared meals and dishes	0.0	0.0	6	0	1	0	86.6	91.0	45.5	28.2
		Manufacture of oils and fats	0.1	0.0	64	76	11	8	147.5	203.8	73.0	77.5
		Other food products	0.0	0.0	0	0	0	0	95.2	124.2	61.5	59.6
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum	0.5	0.7	6,009	3,011	4,899	1,362	9,366.2	1,985.0	125.4	199.4
		Extraction of natural gas										
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	0.7	0.6	185	236	74	92	112.1	168.2	52.5	60.2
		Support activities for petroleum and natural gas extraction	2.0	1.6	412	633	263	221	134.2	194.4	88.1	62.4
Maritime transport	Support activities	Support activities for other mining and quarrying	0.0	0.1	3	9	1	4	100.0	72.4	70.0	51.9
		Sea and coastal passenger water transport	4.4	5.2	1,174	2,149	414	766	94.5	176.2	53.2	59.8
	Renting	Sea and coastal freight water transport	14.3	14.0	22,905	22,001	1,776	1,982	173.5	169.8	67.1	85.1
		Inland freight water transport	0.0	0.0	6	11	3	2	112.5	100.0	47.3	54.5
Ports, warehousing and construction of water projects	Renting	Inland passenger water transport	0.2	0.1	82	50	3	14	29.7	121.2	51.0	55.6
		Renting and leasing of water transport equipment	0.0	0.1	47	117	26	41	1,342.1	1,507.4	23.4	31.5
	Cargo and warehousing	Cargo handling	0.1	0.2	19	36	9	18	84.1	104.3	57.1	74.5
		Warehousing and storage	1.3	1.8	306	410	134	199	107.0	126.9	51.7	53.9
Shipbuilding and repair	Water projects	Construction of water projects	0.6	0.6	310	320	52	78	114.8	135.9	59.8	77.8
		Service activities incidental to water transportation	1.4	2.8	288	563	194	410	158.4	184.4	64.6	64.2
	Equipment	Building of ships and floating structures	2.3	0.9	617	372	124	89	54.0	107.4	69.3	64.2
		Building of pleasure and sporting boats	0.2	0.2	59	53	16	17	73.2	80.2	64.0	52.4
Total Blue Economy	Repair	Repair and maintenance of ships and boats	1.3	1.7	300	452	92	148	81.6	97.9	51.9	59.5
		Manufacture of cordage, rope, twine and netting	0.1	0.0	10	10	3	3	61.1	95.1	41.4	51.1
	Machinery	Manufacture of textiles other than apparel	0.1	0.1	14	23	5	8	59.6	83.3	46.8	46.4
		Manufacture of sport goods										
		Manufacture of engines and turbines, except aircraft	0.4	0.0	248	37	45	5	112.5	110.9	68.8	76.2
		Manufacture of instruments for measuring, testing and navigation	0.0	0.1	4	20	2	10	82.6	138.8	67.1	77.4

Source: Eurostat (SBS), DCF and own calculations.

GERMANY

The German Blue Economy provides about 406,700 jobs and generates around €23 billion in GVA. It is dominated by the ports, warehousing and water projects (29%), followed by the Maritime transport and coastal tourism sectors, both with 20% of the overall GVA in 2017. In terms of employment, coastal tourism produced 38% of the jobs and ports, warehousing and water projects 20%.

The German national GDP has been on the rise for the whole period. However, the same cannot be said of Blue Economy GVA, which showed a large variability throughout the same period. Moreover, its contribution to national GDP was at its lowest in 2017, down 26% on 2009. The Blue Economy's share of employment has remained relatively steady: it has just grown 1% since 2009 both in terms of its contribution to national employment and in eight & in overall Blue Economy jobs. The average wage in Germany's Blue Economy in 2017 was €34,500, a 13.4% increase on 2009.

Germany: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	162.4	156.5	150.5	148.8	153.7	142.2	148.0	147.6	154.1
Marine living resources	43.6	44.2	43.7	46.5	41.9	42.6	45.5	45.9	46.0
Marine non-living resources	19.3	20.0	20.6	19.7	19.8	21.3	21.5	20.2	20.2
Port activities	74.4	74.3	58.2	63.2	67.0	99.2	104.4	112.2	112.2
Shipbuilding and repair	37.0	34.0	33.8	33.2	37.6	37.8	39.0	41.1	40.4
Maritime transport	39.0	38.4	38.7	29.0	31.2	28.6	28.1	33.9	33.9
Blue economy	375.6	367.4	345.5	340.4	351.2	371.7	386.5	400.9	406.7
<i>National employment</i>	<i>37,808</i>	<i>37,337</i>	<i>38,045</i>	<i>38,321</i>	<i>38,640</i>	<i>38,908</i>	<i>39,176</i>	<i>40,165</i>	<i>40,482</i>
Blue economy (% of national jobs)	1.0%	1.0%	0.9%	0.9%	0.9%	1.0%	1.0%	1.0%	1.0%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	4,310	4,184	3,852	3,849	4,082	4,050	4,252	4,437	4,658
Marine living resources	1,933	1,718	2,022	2,722	2,042	1,908	2,279	2,312	2,319
Marine non-living resources	2,119	2,259	2,339	2,654	2,262	2,226	2,042	1,877	1,877
Port activities	3,940	4,201	3,663	4,441	4,148	5,346	5,446	6,589	6,589
Shipbuilding and repair	2,119	2,184	2,271	2,310	2,498	2,526	2,226	3,044	2,986
Maritime transport	8,851	8,446	7,470	6,985	7,381	5,430	5,857	4,524	4,524
Blue economy	23,271	22,991	21,617	22,961	22,413	21,486	22,101	22,784	22,953
<i>National GVA (EUR billion)</i>	<i>2,207.2</i>	<i>2,321.7</i>	<i>2,428.1</i>	<i>2,478.6</i>	<i>2,542.7</i>	<i>2,646.4</i>	<i>2,745.3</i>	<i>2,847.7</i>	<i>2,954.7</i>
Blue economy (% of GVA)	1.1%	1.0%	0.9%	0.9%	0.9%	0.8%	0.8%	0.8%	0.8%

Source: Eurostat, DCF and own calculations.

Germany: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	89.6	80.6	3,698	4,207	1,972	2,175	32.9	39.0	13.5	16.2
	Transport	Transport	36.1	34.0	5,591	5,890	1,616	1,606	56.4	59.1	35.5	40.3
	Other expenditure	Other expenditure	36.7	39.5	2,378	2,807	721	877	35.2	37.4	12.8	14.2
	Capture fisheries	Small-scale coastal fleet	0.6	0.7	9	9	3	5	5.4	9.6	4.3	1.7
Extraction and commercialization of marine living resources		Industrial fleet	1.0	0.8	127	149	63	91	80.9	146.1	37.0	49.7
		Finfish marine aquaculture										
	Aquaculture	Shellfish aquaculture	0.1	0.1	5	25	3	14	46.2	139.7	50.0	27.7
		Freshwater aquaculture	0.7	0.8	93	79	24	25	45.8	44.3	16.2	13.4
		Processing and preserving of fish, crustaceans and molluscs	8.4	7.0	2,180	2,135	342	364	44.0	57.5	31.5	34.7
		Retail sale of fish, crustaceans and molluscs in specialised stores	7.6	6.2	411	449	125	140	30.6	40.1	9.5	11.5
	Processing and distribution	Wholesale of other food, including fish, crustaceans and molluscs	24.0	27.8	12,924	23,482	1,304	1,542	64.7	65.9	30.3	39.1
		Prepared meals and dishes	1.2	2.5	281	481	64	130	59.8	58.8	32.0	35.8
		Manufacture of oils and fats	0.0	0.0	16	38	1	3	93.3	101.1	52.3	59.8
		Other food products	0.1	0.1	26	23	7	6	72.5	85.2	44.3	52.2
Marine extraction of minerals, oil and gas		Extraction of crude petroleum										
	Extraction	Extraction of natural gas	3.8	3.9	2,762	2,978	1,168	716	317.7	186.7	112.8	119.6
		Operation of gravel and sand pits; mining of clays and kaolin	15.5	16.2	2,313	3,179	951	1,161	66.6	80.9	39.4	42.8
	Support activities	Support activities for petroleum and natural gas extraction										
Maritime transport		Support activities for other mining and quarrying										
	Sea and coastal water transport	Sea and coastal passenger water transport	1.6	3.5	370	2,631	218	1,262	154.6	446.7	40.7	44.0
	Inland water transport	Sea and coastal freight water transport	26.8	17.9	20,963	24,922	6,924	2,241	283.6	146.4	49.9	56.2
	Renting	Inland freight water transport	4.1	4.7	1,648	1,643	651	472	213.3	136.5	32.8	33.6
Ports, warehousing and construction of water projects		Inland passenger water transport	4.4	5.8	413	521	186	284	56.2	69.9	22.2	23.1
	Cargo and warehousing	Renting and leasing of water transport equipment	2.1	2.1	1,449	488	872	265	1,221.0	276.5	7.3	9.0
	Water projects	Cargo handling	2.0	3.4	284	526	125	232	68.5	80.5	36.7	45.9
	Service activities	Warehousing and storage	51.6	88.7	5,626	13,827	2,143	4,220	52.3	53.6	29.1	33.1
Shipbuilding and repair		Construction of water projects	2.6	3.3	303	487	117	189	45.5	61.9	45.2	42.2
	Building of ships	Service activities incidental to water transportation	18.1	16.9	2,582	3,380	1,555	1,947	93.1	124.4	50.0	55.5
	Repair	Building of ships and floating structures	15.3	12.6	3,880	4,558	783	1,037	52.5	84.3	57.1	64.7
	Equipment	Building of pleasure and sporting boats	3.7	7.6	983	1,609	257	479	71.3	67.0	44.2	51.3
Total Blue Economy		Repair and maintenance of ships and boats	6.9	5.9	1,252	969	424	307	64.7	58.9	43.0	37.1
		Manufacture of cordage, rope, twine and netting										
	Machinery	Manufacture of textiles other than apparel	0.0	3.0	0	410	0	147	41.1	58.1	25.7	31.6
		Manufacture of sport goods	0.1	0.0	10	5	4	2	47.3	50.9	32.5	35.4
		Manufacture of engines and turbines, except aircraft	9.6	9.8	2,358	3,730	569	896	60.8	93.7	62.9	83.8
		Manufacture of instruments for measuring, testing and navigation	1.4	1.4	219	295	82	117	60.6	87.7	52.1	62.9

Source: Eurostat (SBS), DCF and own calculations.

ESTONIA

The Estonian Blue Economy employs over 29,668 people and generates around €682 million in GVA. It is dominated by the coastal tourism sector, which contributed 56% of the jobs and 37% to overall Blue Economy GVA in 2017. Ports, warehousing and water projects provide 14% of the jobs and generate 37% of the GVA.

The Blue Economy's contribution to the Estonian domestic GDP is around 43%, a 23% drop from 2009 figures. National economy GDP growth outperformed Blue Economy growth rates over the entire period analysed, increasing 67% compared to 2009, against 29%, respectively.

In terms of employment, the Blue Economy is now (i.e. in 2017) responsible for 17% less jobs than it was in 2009. The average wage in the Blue Economy in 2017 was €13,500, a 43% increase on 2009. Compared with 2009 wages, average wages increased in all sectors.

Estonia: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	20.9	19.3	17.8	16.5	14.7	14.5	15.7	16.5	16.7
Marine living resources	4.3	4.3	4.5	4.7	4.6	4.5	4.9	4.4	4.4
Marine non-living resources	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.7	0.7
Port activities	3.6	3.9	4.0	4.1	3.9	4.1	4.1	4.2	4.2
Shipbuilding and repair	2.3	2.4	2.5	2.6	2.6	2.6	2.9	2.8	3.0
Maritime transport	0.9	0.8	0.7	0.8	0.8	0.7	0.7	0.8	0.8
Blue economy	32.7	31.4	30.2	29.2	27.2	27.1	29.0	29.4	29.7
National employment	573	548	582	591	597	600	613	612	626
Blue economy (% of national jobs)	5.7%	5.7%	5.2%	4.9%	4.6%	4.5%	4.7%	4.8%	4.7%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	184	190	204	208	189	193	228	249	252
Marine living resources	42	44	43	47	48	46	48	46	46
Marine non-living resources	13	13	13	19	23	19	22	25	25
Port activities	217	269	295	307	312	313	272	255	255
Shipbuilding and repair	46	48	50	54	58	72	73	68	71
Maritime transport	26	-	2	8	25	15	51	34	34
Blue economy	529	562	596	660	646	666	695	677	682
National GVA (EUR billion)	12.3	12.9	14.6	15.7	16.6	17.5	17.9	18.7	20.5
Blue economy (% of GVA)	4.3%	4.4%	4.1%	4.2%	3.9%	3.8%	3.9%	3.6%	3.3%

Source: Eurostat, DCF and own calculations.

Estonia: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	6.2	5.5	170	221	54	94	9.9	19.1	8.4	11.7
	Transport	Transport	1.3	0.8	189	263	22	21	18.1	28.5	11.3	15.0
	Other expenditure	Other expenditure	13.4	10.4	514	588	108	137	9.0	15.2	7.4	10.4
	Capture fisheries	Small-scale coastal fleet	1.6	2.0	4	6	3	3	8.3	11.3	0.3	0.5
		Industrial fleet	0.3	0.2	13	10	8	7	33.8	47.5	17.4	23.5
Extraction and commercialization of marine living resources	Aquaculture	Finfish marine aquaculture										
		Shellfish aquaculture										
		Freshwater aquaculture	0.0	0.0	1	2	0	0	35.0	5.8	4.5	11.9
	Processing and distribution	Processing and preserving of fish, crustaceans and molluscs	1.8	1.6	110	127	23	22	13.2	14.3	8.6	12.9
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.0	0.0	2	2	0	0	2.4	2.4	2.3	2.3
		Wholesale of other food, including fish, crustaceans and molluscs	0.4	0.4	91	141	7	10	20.1	27.1	11.3	12.5
		Prepared meals and dishes	0.1	0.2	7	9	2	3	15.7	21.2	9.2	13.5
		Manufacture of oils and fats	0.0	0.0	0	0	0	0	63.9	63.9	18.9	18.9
	Marine extraction of minerals, oil and gas	Other food products	0.0	0.0	0	0	0	0	18.9	24.9	11.7	14.3
		Extraction of crude petroleum										
Extraction of natural gas												
Maritime transport	Extraction	Operation of gravel and sand pits; mining of clays and kaolin	0.6	0.6	38	59	13	24	21.0	42.0	13.2	20.4
		Support activities for petroleum and natural gas extraction										
	Support activities	Support activities for other mining and quarrying	0.0	0.0	3	3	1	1	23.3	32.4	11.1	17.5
		Sea and coastal passenger water transport	0.8	0.8	407	530	15	22	18.4	29.9	19.1	30.3
		Sea and coastal freight water transport										
Ports, warehousing and construction of water projects	Inland water transport	Inland freight water transport										
		Inland passenger water transport										
	Renting	Renting and leasing of water transport equipment	0.0	0.0	15	15	12	12	1,277.8	1,277.8	2.5	2.5
		Cargo handling	0.9	0.9	129	91	65	45	75.0	53.2	19.7	23.7
		Warehousing and storage	1.4	1.7	121	156	59	72	45.8	42.9	15.8	18.3
Shipbuilding and repair	Water projects	Construction of water projects	0.1	0.2	8	39	3	6	20.7	36.6	11.3	21.2
		Service activities incidental to water transportation	1.2	1.4	129	201	90	132	85.5	97.6	18.3	27.1
	Building of ships	Building of ships and floating structures	0.3	0.4	31	55	8	15	26.7	37.6	14.0	19.5
		Building of pleasure and sporting boats	0.3	0.3	13	23	6	9	20.4	28.3	10.2	16.8
		Repair	Repair and maintenance of ships and boats	1.2	1.7	91	169	24	37	20.5	22.5	14.7
Equipment	Manufacture of cordage, rope, twine and netting	0.1	0.0	3	1	2	0	20.6	10.9	9.4	10.9	
	Manufacture of textiles other than apparel	0.2	0.3	9	22	3	6	15.4	19.3	9.4	13.4	
	Manufacture of sport goods	0.2	0.2	9	8	4	3	18.8	16.8	8.6	11.5	
Machinery	Manufacture of engines and turbines, except aircraft											
	Manufacture of instruments for measuring, testing and navigation	0.0	0.0	0	2	0	0	19.8	35.8	11.5	20.6	
Total Blue Economy			32.7	29.7	2,107	2,741	529	682	18.6	26.7	9.5	13.5

Source: Eurostat (SBS), DCF and own calculations.

IRELAND¹⁵¹

The Irish Blue Economy employs over 47,800 people and generates around €2.15 billion in GVA. It is dominated by the coastal tourism sector, which contributed 76% to jobs and 61% to GVA in 2017.

Overall, the Blue Economy's GVA increased 63% compared to 2009, increasing in all sectors: 76% in living resources, 5% in ports, warehousing and water projects. 63% in Maritime transport, 67% in Shipbuilding and 73% in coastal tourism. Likewise, overall Blue Economy jobs increased 9% compared to 2009. However, the number of jobs decreased in living resources and Maritime transport, while coastal tourism and ports, warehousing and water projects saw significant increases in jobs, with a less sharp increase for the Shipbuilding sector.

Although the share of the Blue Economy in national Irish GDP is relatively low (never above 1% over the reporting period), it has seen an overall decrease of 6%. For employment, the data clearly shows that Blue Economy jobs are now at their highest level for the period under analysis, as is the Blue Economy's percentage of overall jobs, which grew by 19%. The average wage in the Irish Blue Economy in 2017 was €27,500, a 2% decrease on 2009.

151. National reporting by Ireland on its ocean economy differs due to differences in definitions and methodology. (e.g. basic prices instead at factor cost). In addition, due to confidentiality with data, the figures presented differ to national reporting (e.g. Eurostat data does not include data for some sectors such as shipping and oil & gas).

Ireland: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	25.4	25.9	27.5	28.5	25.3	25.8	31.0	33.0	36.5
Marine living resources	9.6	8.6	7.2	7.1	7.3	7.4	7.7	8.0	7.8
Marine non-living resources	2.5	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Port activities	1.1	1.0	1.0	1.0	0.9	0.9	1.1	1.2	1.2
Shipbuilding and repair	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.8
Maritime transport	0.9	0.9	0.9	0.7	0.7	0.7	0.7	0.7	0.7
Blue economy	40.2	38.2	38.1	38.9	35.8	36.3	42.0	44.5	47.8
National employment	1,970	1,879	1,840	1,831	1,885	1,933	1,995	2,066	2,125
Blue economy (% of national jobs)	2.0%	2.0%	2.1%	2.1%	1.9%	1.9%	2.1%	2.2%	2.2%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	761	734	797	819	762	785	976	1,196	1,320
Marine living resources	235	254	300	325	288	347	299	404	413
Marine non-living resources	61	56	62	61	67	65	53	55	55
Port activities	83	66	55	58	63	60	62	88	88
Shipbuilding and repair	49	49	52	43	51	50	49	53	54
Maritime transport	130	147	153	146	167	165	217	217	217
Blue economy	1,319	1,306	1,419	1,452	1,399	1,473	1,657	2,014	2,147
National GVA (EUR billion)	152.2	152.1	155.1	158.5	165.0	179.4	245.6	255.2	275.9
Blue economy (% of GVA)	0.9%	0.9%	0.9%	0.9%	0.8%	0.8%	0.7%	0.8%	0.8%

Source: Eurostat, DCF and own calculations.

Ireland: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	14.7	20.8	974	1,346	328	701	67.9	69.4	21.8	23.6
	Transport	Transport	3.0	3.1	945	1,207	207	237	209.5	181.8	51.8	54.8
	Other expenditure	Other expenditure	7.7	12.5	919	1,254	227	382	94.3	66.8	21.7	22.5
	Capture fisheries	Small-scale coastal fleet	2.7	1.2	15	38	9	24	4.5	26.3		9.1
Extraction and commercialization of marine living resources	Aquaculture	Industrial fleet	2.2	2.1	157	275	55	149	31.7	84.3	21.1	38.6
		Finfish marine aquaculture	0.2	0.2	65	106	17	31	119.1	192.5	79.3	32.7
		Shellfish aquaculture	1.7	1.7	36	61	14	39	17.5	47.5	5.8	11.6
		Freshwater aquaculture	0.1	0.0	7	5	3	1	45.6	24.8	23.9	42.0
	Processing and distribution	Processing and preserving of fish, crustaceans and molluscs	1.9	2.4	472	602	107	163	57.6	70.6	36.4	34.5
		Retail sale of fish, crustaceans and molluscs in specialised stores										
		Wholesale of other food, including fish, crustaceans and molluscs										
		Prepared meals and dishes	0.8	0.2	116	22	31	6	39.2	34.3	32.5	33.1
		Manufacture of oils and fats										
		Other food products										
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum										
		Extraction of natural gas										
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	2.4	0.8	672	159	56	49	40.1	69.1	78.8	53.4
		Support activities for petroleum and natural gas extraction	0.0	0.0	31	6	2	4	412.5	405.3	48.1	42.9
Maritime transport	Sea and coastal water transport	Support activities for other mining and quarrying	0.1	0.1	25	10	2	3	219.0	45.6	59.0	61.5
		Sea and coastal passenger water transport	0.5	0.3	408	416	102	142	568.3	1,314.8	49.3	43.4
	Inland water transport	Sea and coastal freight water transport	0.3	0.3	281	316	21	69	213.3	616.1	54.2	39.6
		Inland freight water transport										
	Renting	Inland passenger water transport	0.1	0.1	26	11	7	6	328.6	206.9	35.0	36.3
		Renting and leasing of water transport equipment										
Ports, warehousing and construction of water projects	Cargo and warehousing	Cargo handling										
		Warehousing and storage	1.0	1.0	251	248	79	78	231.7	81.5	48.5	50.2
	Water projects	Construction of water projects	0.1	0.1	13	27	4	10	71.2	82.3	32.9	45.0
		Service activities incidental to water transportation										
Shipbuilding and repair	Building of ships	Building of ships and floating structures	0.1	0.1	17	8	5	4	92.9	61.0	36.9	41.2
		Building of pleasure and sporting boats	0.1	0.0	6	4	3	2	88.9	31.4	31.4	27.3
	Repair	Repair and maintenance of ships and boats	0.2	0.3	32	44	11	20	70.7	89.6	32.0	37.1
		Manufacture of cordage, rope, twine and netting	0.1	0.1	17	14	5	5	46.9	54.9	34.5	38.7
	Equipment	Manufacture of textiles other than apparel	0.1	0.1	12	15	4	5	44.2	47.7	24.7	27.8
		Manufacture of sport goods	0.0	0.0	0	1	0	0	72.2	96.6	21.7	24.3
Machinery		Manufacture of engines and turbines, except aircraft	0.1	0.1	6	14	3	4	47.9	38.4	54.4	38.5
		Manufacture of instruments for measuring, testing and navigation	0.1	0.1	34	26	17	13	223.9	237.8	48.3	52.2
Total Blue Economy			40.2	47.8	5,539	6,233	1,319	2,147	72.4	82.4	28.1	27.5

Source: Eurostat(SBS), DCF and own calculations.

GREECE

The Blue Economy sectors in Greece employ over 347,000 people and generates around €6 billion in GVA. Overall, Blue Economy jobs increased by 93% and GVA by 32% compared to 2009. Greece's Blue Economy is dominated by the coastal tourism sector, which contributed 77% to jobs, 56% to GVA in 2017. Maritime transport is also a large contributor, with 17% of GVA and 5% of the employment, while the living resource sector on the other hand generates 11% of the jobs but contributes only 1% to GVA.

The Blue Economy has had a significant positive impact on Greek GDP and employment. While the national GDP fell strongly (24%) between 2009 and 2017, Blue Economy GVA rose (32%). Additionally, the percentage that the Blue Economy contributes to overall national GVA reached 3.3% in 2016, which is a 73% increase from the 2009 figure, when it stood at 1.9%.

The same can be said for jobs: where the national levels fell overall, Blue Economy-based jobs grew by approximately 93%. The share of jobs covered by the Blue Economy now amounts to around 9.4%, whereas in 2009 this figure was about 4.0%, reflecting a 134% increase. The average wage in the Greek Blue Economy in 2017 was €13,400, a 26% decrease on 2009.

Greece: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	97.5	106.6	122.8	112.9	136.5	145.8	155.5	209.0	266.3
Marine living resources	43.2	44.3	43.6	42.7	39.3	37.8	37.9	38.3	38.1
Marine non-living resources	3.0	3.0	3.0	3.0	1.9	1.9	1.5	1.1	1.1
Port activities	6.8	6.7	6.1	5.7	6.3	6.3	15.6	15.5	15.5
Shipbuilding and repair	9.5	9.0	6.5	6.6	5.7	5.8	7.8	8.4	8.4
Maritime transport	19.6	17.7	17.6	16.0	15.3	16.0	17.8	17.7	17.7
Blue economy	179.6	187.3	199.6	186.9	204.9	213.7	236.0	290.0	347.1
National employment	4,469	4,306	3,979	3,636	3,459	3,480	3,548	3,610	3,683
Blue economy (% of national jobs)	4.0%	4.4%	5.0%	5.1%	5.9%	6.1%	6.7%	8.0%	9.4%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	2,269	2,319	2,566	2,135	2,480	2,769	2,310	2,593	3,342
Marine living resources	309	289	289	237	176	355	261	649	637
Marine non-living resources	203	210	210	210	116	121	117	57	57
Port activities	331	342	276	257	268	270	718	767	767
Shipbuilding and repair	441	265	235	200	175	184	218	186	186
Maritime transport	1,015	694	615	688	634	731	1,121	1,025	1,025
Blue economy	4,569	4,119	4,191	3,725	3,848	4,429	4,746	5,277	6,014
National GVA (EUR billion)	212.4	199.6	181.9	169.0	160.2	157.9	156.6	154.0	157.5
Blue economy (% of GVA)	2.2%	2.1%	2.3%	2.2%	2.4%	2.8%	3.0%	3.4%	3.8%

Source: Eurostat, DCF and own calculations.

Greece: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	56.0	126.7	2,879	4,871	1,689	2,476	97.0	26.6	17.7	10.8
	Transport	Transport	6.5	12.1	1,585	3,048	138	454	31.1	50.5	25.3	18.2
	Other expenditure	Other expenditure	35.0	127.5	2,124	3,927	442	413	36.6	6.6	8.4	5.0
		Small-scale coastal fleet	21.8	19.4	38	227	-	84	134	-	7.6	1.1
Extraction and commercialization of marine living resources	Capture fisheries	Industrial fleet	5.8	5.3	28	224	-	76	123	-	23.5	8.2
		Finfish marine aquaculture	3.2	3.1	476	564	115	194	42.6	72.4	21.6	16.1
		Shellfish aquaculture	0.7	0.4	11	10	1	10	1.9	17.5	2.5	3.1
		Freshwater aquaculture	0.2	0.3	11	11	1	6	8.9	26.5	10.8	4.9
		Processing and preserving of fish, crustaceans and molluscs	1.2	1.4	158	207	43	40	38.9	31.2	18.8	15.9
		Retail sale of fish, crustaceans and molluscs in specialised stores	4.6	4.1	327	200	77	7	118.2	4.7	2.8	3.9
		Wholesale of other food, including fish, crustaceans and molluscs	5.8	3.9	2,001	1,062	231	119	52.4	43.1	19.0	15.3
	Processing and distribution	Prepared meals and dishes	0.0	0.2	1	8	0	2	21.7	16.9	11.5	12.8
		Manufacture of oils and fats										
		Other food products	0.0	0.0	1	2	0	1	34.5	35.6	17.9	19.9
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum										
		Extraction of natural gas										
		Operation of gravel and sand pits; mining of clays and kaolin	2.8	0.9	402	114	195	46	71.0	67.2	33.5	23.3
	Support activities	Support activities for petroleum and natural gas extraction	0.1	0.2	15	12	8	8	55.5	50.4	49.3	42.9
		Support activities for other mining and quarrying		0.1		5	3	3	67.4		67.3	
Maritime transport	Sea and coastal water transport	Sea and coastal passenger water transport	11.8	8.4	1,660	1,157	734	479	77.5	63.8	37.4	33.4
		Sea and coastal freight water transport	5.0	7.6	448	758	247	519	54.9	70.0	31.1	59.5
	Inland water transport	Inland freight water transport										
		Inland passenger water transport										
	Renting	Renting and leasing of water transport equipment	2.8	1.8	49	75	34	27	38.5	3.5	6.0	
		Cargo handling	0.5	0.8	41	93	16	41	36.0	54.2	23.6	28.4
Ports, warehousing and construction of water projects	Warehousing	Warehousing and storage	0.6	0.5	54	42	18	13	31.5	29.8	22.9	19.8
	Water projects	Construction of water projects	2.7	1.4	278	192	95	13	46.0	12.7	17.6	13.5
	Service activities	Service activities incidental to water transportation	3.0	12.8	266	944	202	699	80.8	57.8	36.0	49.8
		Building of ships and floating structures	4.1	1.5	425	60	273	34	78.8	25.1	33.1	27.2
Shipbuilding and repair	Building of ships	Building of pleasure and sporting boats	0.2	0.2	11	14	4	4	21.8	23.3	22.2	15.8
	Repair	Repair and maintenance of ships and boats	4.8	6.3	235	256	153	140	41.6	27.0	17.9	14.8
		Manufacture of cordage, rope, twine and netting	0.1	0.1	11	8	4	3	48.0	53.9	23.7	20.1
	Equipment	Manufacture of textiles other than apparel										
		Manufacture of sport goods	0.2	0.3	19	17	7	5	35.4	18.7	14.8	11.4
Machinery		Manufacture of engines and turbines, except aircraft	0.0	0.0	0	1	0	0	59.6	17.4	31.4	14.6
		Manufacture of instruments for measuring, testing and navigation	0.0	0.0	0	0	0	0	33.6	41.5	20.7	23.2
Total Blue Economy			179.6	347.1	13,553	18,108	4,569	6,014	46.8	25.7	15.9	11.7

Source: Eurostat (SBS), DCF and own calculations.

SPAIN

The Spanish Blue Economy employs over 757,500 people and generates around €26.3 billion in GVA. It is dominated by the coastal tourism sector, which contributed 75% to Blue Economy jobs and 67% to GVA in 2017. The living resources sector is also an important contributor, with 15% of jobs and 13% of GVA.

The Blue Economy has generally had a positive impact on the Spanish economy and employment rates. In Spain, the share of Blue Economy GVA to national GDP increased by 10% between 2009 and 2017. In addition, Blue Economy GVA share was at its highest with 2.25% in 2017 and growing at a faster pace than the overall national GDP.

On employment, a similar pattern emerges. The share of Blue Economy jobs to national employment increased by 10% in 2009-2017. Although national employment decreased by 2% over the reporting period and was at lower levels in 2017 than in 2009, Blue Economy jobs grew and were at higher levels by 2017 than in 2009. Average wage in the Spanish Blue Economy in 2017 was €21,700, a 2% decrease on 2009.

Spain: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	461.0	455.9	443.8	447.6	447.7	422.6	445.3	501.1	565.3
Marine living resources	134.9	134.4	126.8	119.5	115.3	114.6	114.0	113.8	113.4
Marine non-living resources	11.7	11.6	9.9	8.6	6.8	6.7	6.7	7.9	7.9
Port activities	51.8	45.5	43.2	40.2	38.0	37.5	38.9	37.3	37.3
Shipbuilding and repair	27.9	25.2	23.9	23.1	20.4	21.1	22.2	23.4	23.5
Maritime transport	10.5	10.2	10.0	9.7	9.5	9.4	9.7	10.0	10.0
Blue economy	697.8	682.8	657.6	648.9	637.9	611.9	636.7	693.6	757.5
<i>National employment</i>	<i>18,957</i>	<i>18,574</i>	<i>18,271</i>	<i>17,477</i>	<i>17,002</i>	<i>17,211</i>	<i>17,717</i>	<i>18,183</i>	<i>18,649</i>
Blue economy (% of national jobs)	3.7%	3.7%	3.6%	3.7%	3.8%	3.6%	3.6%	3.8%	4.1%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	12,761	12,806	12,715	12,579	12,747	12,357	14,044	15,594	17,543
Marine living resources	3,088	3,125	3,208	2,930	3,063	3,332	3,239	3,501	3,539
Marine non-living resources	728	629	552	443	454	413	389	444	444
Port activities	3,596	3,428	3,346	3,236	3,015	2,990	3,116	3,060	3,060
Shipbuilding and repair	1,230	1,453	1,165	1,142	839	1,113	922	868	869
Maritime transport	687	725	629	645	629	650	759	828	828
Blue economy	22,091	22,166	21,615	20,975	20,747	20,855	22,469	24,296	26,284
<i>National GVA (EUR billion)</i>	<i>1,006.1</i>	<i>989.9</i>	<i>983.7</i>	<i>954.0</i>	<i>935.6</i>	<i>944.5</i>	<i>981.0</i>	<i>1,014.8</i>	<i>1,057.5</i>
Blue economy (% of GVA)	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.3%	2.4%	2.5%

Source: Eurostat, DCF and own calculations.

Spain: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand		
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017	
Coastal tourism	Accommodation	Accommodation	216.2	224.1	13,382	17,595	6,792	9,131	35.7	45.8	24.7	24.7	
	Transport	Transport	38.9	51.0	7,263	11,489	1,754	2,980	47.3	62.9	40.8	40.5	
	Other expenditure	Other expenditure	205.8	290.2	13,619	17,917	4,214	5,432	34.4	33.5	13.1	12.9	
	Capture fisheries	Small-scale coastal fleet	11.8	8.6	196	156	128	116	17.6	19.0	4.5	5.5	
Extraction and commercialization of marine living resources	Aquaculture	Industrial fleet	26.2	22.3	1,793	1,842	756	994	26.5	43.1	22.7	22.6	
		Finfish marine aquaculture	2.3	2.4	288	493	7	163	3.9	83.5	23.8	32.6	
		Shellfish aquaculture	25.8	14.5	126	84	71	60	19.6	15.5	0.6	1.1	
	Processing and distribution	Freshwater aquaculture	0.8	1.0	63	63	16	16	24.2	21.7	20.4	14.6	
		Processing and preserving of fish, crustaceans and molluscs	19.4	20.5	4,118	5,752	722	822	39.9	41.4	22.1	25.3	
		Retail sale of fish, crustaceans and molluscs in specialised stores	21.4	20.8	1,705	1,582	340	308	41.9	36.2	6.6	7.2	
		Wholesale of other food, including fish, crustaceans and molluscs	26.1	21.5	9,868	9,381	988	963	47.7	55.7	24.0	26.2	
	Support activities	Prepared meals and dishes	1.0	1.8	257	531	56	92	58.7	53.0	28.0	28.1	
		Manufacture of oils and fats	0.0	0.1	19	47	1	3	58.7	64.1	31.4	28.5	
		Other food products	0.0	0.0	6	7	2	2	51.6	48.1	28.5	25.2	
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum	0.3	0.9	75	217	42	128	141.5	156.3	97.1	118.5	
		Extraction of natural gas	0.0	0.0	3	3	1	1	81.3	81.3	40.0	40.0	
		Operation of gravel and sand pits; mining of clays and kaolin	11.2	6.2	1,700	811	655	255	62.1	45.8	32.5	29.4	
	Support activities	Support activities for petroleum and natural gas extraction	0.2	0.2	56	54	30	26	153.8	212.0	54.9	83.0	
		Support activities for other mining and quarrying		0.6		83		33		55.2		44.9	
Maritime transport	Sea and coastal water transport	Sea and coastal passenger water transport	4.5	3.5	897	621	258	264	58.3	80.2	34.3	32.5	
	Inland water transport	Sea and coastal freight water transport	2.8	3.2	931	1,299	242	376	86.3	118.5	42.1	44.7	
		Inland freight water transport	0.0	0.1	4	4	2	2	34.9	34.0	22.4	22.4	
		Inland passenger water transport	0.4	0.5	21	21	13	14	37.9	35.9	20.2	18.6	
Ports, warehousing and construction of water projects	Renting	Renting and leasing of water transport equipment	2.7	2.7	300	300	173	173	155.0	155.0	10.5	10.5	
		Cargo handling	4.1	3.6	446	486	251	264	64.6	78.5	47.4	58.9	
	Cargo and warehousing	Warehousing and storage	3.4	3.9	403	628	207	272	64.8	74.4	32.5	35.1	
		Water projects	26.1	11.8	3,551	1,329	1,151	538	45.2	49.8	34.9	38.7	
	Service activities	Service activities incidental to water transportation	18.1	18.1	4,062	4,062	1,987	1,987	115.8	115.8	45.6	45.6	
		Building of ships and floating structures	12.7	9.2	4,008	1,596	600	290	49.5	32.6	46.8	48.8	
	Building of ships	Building of pleasure and sporting boats	1.3	0.6	171	65	72	18	59.0	33.3	38.0	34.1	
		Repair	Repair and maintenance of ships and boats	12.8	11.8	1,059	1,137	499	482	44.2	48.5	30.9	30.7
	Shipbuilding and repair	Equipment	Manufacture of cordage, rope, twine and netting	0.3	0.5	36	56	10	16	39.1	39.4	19.2	20.2
			Manufacture of textiles other than apparel	0.1	0.8	7	72	2	20	30.0	34.4	20.8	18.7
Machinery		Manufacture of sport goods	0.0	0.1	3	8	1	2	52.6	41.2	29.6	27.0	
	Manufacture of engines and turbines, except aircraft	0.1	0.1	21	21	7	5	137.2	71.1	39.5	49.0		
Total Blue Economy		Manufacture of instruments for measuring, testing and navigation	0.6	0.6	83	102	38	37	66.9	65.9	40.3	40.3	

Source: Eurostat (SBS), DCF and own calculations.

FRANCE

The French Blue Economy employs about 367,500 people and generates around €20.2 billion in GVA. It is dominated by the coastal tourism sector, which contributed 50% of jobs and 44% of GVA in 2017.

Overall, the percentage of the Blue Economy in terms of GVA decreased between 2009 and 2016 and in fact, was at its lowest in 2017 (contributing a meagre 0.9% share). By contrast, national GDP in France has been increasing for the whole period.

As for employment, at a national level it remained steady over the period of analysis, whereas Blue Economy-based employment did not have a clear pattern for our analysis period. Nevertheless, the Blue Economy's contribution to employment only decreased by 8% in those 8 years. This reduction is the result of a 6% decrease in the number of jobs in coastal tourism since 2009. The average wage in Blue Economy-based jobs in 2017 was €41,900, a 14% increase on 2009.

France: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	195.4	180.8	180.2	168.4	174.0	179.3	150.4	160.4	183.8
Marine living resources	71.4	70.2	65.2	67.9	65.0	63.1	60.9	62.5	62.1
Marine non-living resources	19.7	19.7	19.2	18.7	17.8	15.8	14.9	13.7	13.7
Port activities	58.9	58.9	59.4	65.6	62.9	59.0	63.8	59.9	59.9
Shipbuilding and repair	30.8	31.6	32.1	33.2	34.5	34.4	33.1	33.2	32.7
Maritime transport	18.1	18.1	16.6	14.9	17.2	17.3	17.8	15.2	15.2
Blue economy	394.4	379.4	372.7	368.6	371.4	368.9	340.9	345.1	367.5
National employment	26,109	26,109	26,109	26,109	26,109	26,109	26,118	26,243	26,512
Blue economy (% of national jobs)	1.5%	1.5%	1.4%	1.4%	1.4%	1.4%	1.3%	1.3%	1.4%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	8,241	8,157	8,527	7,854	8,351	8,401	7,922	7,650	8,800
Marine living resources	2,542	2,708	2,706	2,750	2,792	2,750	2,887	3,022	2,909
Marine non-living resources	1,840	1,865	1,852	1,756	1,754	1,446	1,321	1,343	1,343
Port activities	4,594	4,096	8,184	4,222	4,329	4,053	4,153	4,044	4,044
Shipbuilding and repair	1,458	1,850	2,115	2,188	2,256	2,098	2,145	2,154	2,118
Maritime transport	718	2,636	1,233	1,960	1,786	1,878	1,959	962	962
Blue economy	19,394	21,313	24,618	20,731	21,269	20,626	20,387	19,176	20,177
National GVA (EUR billion)	1,750.1	1,797.8	1,848.6	1,875.3	1,899.8	1,927.2	1,967.5	1,991.3	2,042.1
Blue economy (% of GVA)	1.1%	1.2%	1.3%	1.1%	1.1%	1.1%	1.0%	1.0%	1.0%

Source: Eurostat, DCF and own calculations.

France: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	66.1	65.9	6,695	7,979	2,711	2,945	54.9	51.2	30.5	33.5
	Transport	Transport	43.8	33.7	6,768	7,320	2,597	2,556	61.5	82.4	54.4	59.6
	Other expenditure	Other expenditure	85.5	84.2	9,965	11,228	2,934	3,300	51.0	51.6	25.9	30.9
	Capture fisheries	Small-scale coastal fleet	7.9	6.9	260	201	173	129	84.5	58.6	15.4	12.7
Extraction and commercialization of marine living resources		Industrial fleet	7.9	6.6	850	935	366	535	65.4	99.2	39.7	51.6
		Finfish marine aquaculture										
	Aquaculture	Shellfish aquaculture	18.2	13.8	757	697	431	389	44.7	49.2	6.5	8.1
		Freshwater aquaculture	1.2	1.2	118	113	36	32	37.2	34.3	16.6	11.2
Processing and distribution		Processing and preserving of fish, crustaceans and molluscs	12.8	13.7	3,029	4,173	560	652	56.9	51.5	32.0	39.4
		Retail sale of fish, crustaceans and molluscs in specialised stores	4.7	4.0	609	828	134	200	52.6	71.1	23.4	34.2
		Wholesale of other food, including fish, crustaceans and molluscs	13.9	11.5	6,141	7,096	607	757	71.9	77.8	31.4	45.6
		Prepared meals and dishes	4.7	4.2	1,064	989	228	208	51.8	56.7	37.6	38.1
Marine extraction of minerals, oil and gas		Manufacture of oils and fats	0.0	0.0	3	16	0	1	120.7	96.1	33.2	62.1
		Other food products	0.1	0.1	47	34	8	8	79.9	87.8	57.1	47.1
	Extraction	Extraction of crude petroleum			149	149	100	100				
		Extraction of natural gas			0	0						
Support activities		Operation of gravel and sand pits; mining of clays and kaolin	19.6	13.4	5,409	4,197	1,754	1,183	97.0	96.9	46.3	50.8
		Support activities for petroleum and natural gas extraction	0.0	0.2	66	96	13	48	390.4	326.2	413.6	478.3
		Support activities for other mining and quarrying	0.1	0.2	12	42	1	12	23.7	103.5	16.0	47.6
		Sea and coastal passenger water transport	5.5	5.1	882	1,606	239	416	51.6	84.4	45.5	50.9
Maritime transport		Sea and coastal freight water transport	8.8	5.9	9,040	11,675	186	142	22.3	27.8	61.4	87.3
		Inland freight water transport	1.7	1.4	371	274	99	95	107.8	109.2	33.9	36.1
		Inland passenger water transport	2.0	2.5	307	359	110	136	61.5	50.2	40.8	46.1
		Renting and leasing of water transport equipment	0.1	0.2	611	535	456	458	###	4,276.6	25.8	25.7
Ports, warehousing and construction of water projects		Cargo handling	12.8	12.4	1,863	2,288	682	839	57.6	75.5	49.1	54.1
		Warehousing and storage	32.3	36.2	5,217	7,508	1,941	2,191	69.0	66.7	36.4	42.5
		Construction of water projects	5.0	3.1	1,641	1,176	1,243	71	250.2	24.8	82.6	104.7
		Service activities incidental to water transportation	8.8	8.2	1,170	1,747	729	943	85.2	122.1	58.8	79.8
Shipbuilding and repair		Building of ships and floating structures	12.6	14.8	3,989	4,565	606	1,110	59.2	81.2	58.7	67.1
		Building of pleasure and sporting boats	7.5	7.2	1,040	1,297	258	424	34.7	65.2	40.1	40.9
		Repair and maintenance of ships and boats	6.6	6.8	903	972	292	291	54.5	63.0	38.6	36.1
		Manufacture of cordage, rope, twine and netting	0.1	0.1	22	20	6	5	43.7	52.9	34.9	36.6
Equipment		Manufacture of textiles other than apparel	0.3	1.2	41	154	12	45	44.0	52.0	32.6	32.0
		Manufacture of sport goods	0.4	0.5	103	111	23	38	58.0	98.6	57.4	48.8
		Manufacture of engines and turbines, except aircraft	0.3	0.3	127	103	28	22	100.5	83.6	61.6	64.1
		Manufacture of instruments for measuring, testing and navigation	3.0	1.9	655	474	233	183	79.4	106.5	67.5	76.1
Total Blue Economy			394.4	367.5	69,923	80,952	19,394	20,177	62.9	65.5	36.7	41.9

Source: Eurostat (SBS), DCF and own calculations.

CROATIA

The Croatian Blue Economy employs 144,165 people and generates around €3.1 billion in GVA. It is dominated by the coastal tourism sector, which contributed 75% to jobs and 80% to GVA in 2017.

The Blue Economy contributes 6.4% to the national economy in terms of GVA and 9% in terms of jobs. Overall, Blue Economy-based GVA increased 31% compared to 2009 due solely to coastal tourism and the extraction of marine resource sectors as the sectors ports; Shipbuilding and transport all saw decreases compared to 2009.

Conversely, Blue Economy jobs decreased 4% compared to 2009, only increasing in the living resources and Maritime transport sectors. The marine extraction of mineral, oil & gas and Shipbuilding have lost a significant amount of jobs since 2009 (49% and 45%, respectively).

Croatia: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	106.6	103.2	97.7	95.7	91.4	100.2	84.5	79.6	107.8
Marine living resources	10.0	9.8	9.2	9.2	9.5	9.7	9.2	11.6	12.4
Marine non-living resources	4.6	5.5	5.3	5.2	5.0	5.1	4.8	2.3	2.3
Port activities	5.5	5.2	5.9	5.5	5.5	5.3	5.3	5.2	5.2
Shipbuilding and repair	17.7	16.6	15.4	13.7	14.6	9.6	9.8	10.0	9.7
Maritime transport	6.1	6.2	6.5	6.3	6.3	6.4	6.4	6.6	6.6
Blue economy	150.5	146.5	139.9	135.6	132.3	136.3	120.0	115.4	144.2
National employment	1,708	1,649	1,584	1,528	1,494	1,542	1,559	1,567	1,603
Blue economy (% of national jobs)	8.8%	8.9%	8.8%	8.9%	8.9%	8.8%	7.7%	7.4%	9.0%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	1,617	1,632	1,561	1,614	1,814	1,905	1,764	1,830	2,501
Marine living resources	70	67	65	67	85	56	122	120	116
Marine non-living resources	61	97	104	97	89	117	100	97	97
Port activities	147	124	124	117	117	121	120	131	131
Shipbuilding and repair	277	292	237	156	116	103	137	100	95
Maritime transport	200	179	177	154	186	164	227	175	175
Blue economy	2,372	2,391	2,268	2,204	2,406	2,465	2,469	2,454	3,115
National GVA (EUR billion)	38.5	38.3	38.3	37.1	36.6	36.3	37.0	38.7	40.4
Blue economy (% of GVA)	6.2%	6.2%	5.9%	5.9%	6.6%	6.8%	6.7%	6.3%	7.7%

Source: Eurostat, DCF and own calculations.

Croatia: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	57.7	48.7	2,087	2,729	1,094	1,593	24.6	35.1	11.6	14.3
	Transport	Transport	9.6	12.5	1,041	1,115	157	322	18.7	26.7	12.6	15.2
	Other expenditure	Other expenditure	39.3	46.6	1,633	2,170	366	586	14.1	17.3	6.9	7.7
		Small-scale coastal fleet	2.2	5.4	8	9	0	3	0.5	4.8	1.6	0.5
Extraction and commercialization of marine living resources	Capture fisheries	Industrial fleet	2.7	2.6	46	51	12	23	6.9	13.4	5.5	7.1
		Finfish marine aquaculture	1.0	1.0	105	133	13	36	15.8	36.1	13.2	15.5
		Shellfish aquaculture	0.8	0.2	13	5	7	2	21.7	17.7	4.8	6.0
		Freshwater aquaculture	1.0	1.0	24	47	5	12	6.4	21.5	16.0	5.1
		Processing and preserving of fish, crustaceans and molluscs	1.8	1.4	87	97	27	27	19.5	20.7	9.7	12.4
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.2	0.3	9	15	1	3	7.5	13.0	3.5	6.7
		Wholesale of other food, including fish, crustaceans and molluscs	0.3	0.5	30	72	5	9	24.4	21.7	8.8	11.8
	Processing and distribution	Prepared meals and dishes	0.0	0.0	0	1	0	0	23.5	17.1	11.7	9.8
		Manufacture of oils and fats	0.0	0.0	0	0	0	0	32.9	31.2	15.4	14.7
		Other food products										
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum										
		Extraction of natural gas	2.4	0.0								
		Operation of gravel and sand pits; mining of clays and kaolin	1.0	1.4	72	99	7	43	7.8	33.6	14.6	13.2
	Support activities	Support activities for petroleum and natural gas extraction	1.2	0.9	118	118	55	55	56.2	65.7	29.0	37.1
		Support activities for other mining and quarrying	0.0	0.0	0	2	0	0	20.0	5.1	10.0	12.8
Maritime transport	Sea and coastal water transport	Sea and coastal passenger water transport	3.2	3.4	119	164	74	60	32.5	20.4	13.4	13.2
		Sea and coastal freight water transport	0.8	0.7	235	157	72	55	118.2	75.1	51.5	35.4
	Inland water transport	Inland freight water transport	0.2	0.0	6	2	3	0	17.1	12.9	12.8	8.6
		Inland passenger water transport		0.0		0	0	0	20.0			
	Renting	Renting and leasing of water transport equipment	2.1	2.5	183	193	52	59	52.1	39.9	9.1	7.5
Ports, warehousing and construction of water projects	Cargo and warehousing	Cargo handling	0.3	0.2	7	8	5	4	18.1	16.8	12.6	13.7
		Warehousing and storage	0.2	0.8	39	74	12	24	75.3	32.1	15.9	13.0
	Water projects	Construction of water projects	3.6	2.8	184	174	81	61	30.6	22.6	14.3	14.3
	Service activities	Service activities incidental to water transportation	1.4	1.4	87	74	49	43	42.5	33.4	19.3	19.2
		Building of ships and floating structures	12.4	5.6	755	295	186	22	17.8	4.0	13.8	15.4
Shipbuilding and repair	Building of ships	Building of pleasure and sporting boats	0.6	0.3	21	13	7	1	13.7	4.9	10.2	9.3
	Repair	Repair and maintenance of ships and boats	3.3	3.4	122	167	58	66	21.2	19.9	12.5	13.1
		Manufacture of cordage, rope, twine and netting	0.0	0.1	1	2	1	1	18.3	9.5	8.4	7.3
	Equipment	Manufacture of textiles other than apparel	0.0	0.1	1	3	0	1	11.2	12.5	7.1	8.0
		Manufacture of sport goods	0.0	0.1	1	5	0	2	7.8	21.8	6.7	8.3
Machinery		Manufacture of engines and turbines, except aircraft	1.2	0.1	70	6	25	2	24.3	29.1	15.1	15.5
		Manufacture of instruments for measuring, testing and navigation	0.0		1		0		23.6		15.8	
Total Blue Economy			150.5	144.2	7,104	7,999	2,372	3,115	21.6	26.2	10.9	11.6

Source: Eurostat (SBS), DCF and own calculations.

ITALY

The Italian Blue Economy employs over 413,000 people and generates around €19.8 billion in GVA. It is dominated by the coastal tourism sector, which contributed 49% to jobs and 36% to GVA in 2017. Maritime transport is also an important contributor to the Blue Economy, generating 12% of jobs and 16% of GVA. Overall, Blue Economy-based jobs decreased by 8%, while GVA has seen a 15% increase compared to 2009.

Italy's national GDP has increased by 10% in recent years and the Blue Economy's contribution has increased further 5%. As for Blue Economy GVA, after seeing a downward trend in 2011-2014, a rise has been observed since. Employment has fallen at the national level (1%) and even more so for the Blue Economy (8%). Hence, the Blue Economy share of overall employment has decreased over the reporting period.

Italy: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	236.0	212.6	209.9	201.6	182.6	160.4	165.0	185.8	203.4
Marine living resources	73.5	73.6	72.2	74.6	71.5	70.4	69.6	74.5	74.1
Marine non-living resources	19.6	19.2	18.2	17.3	16.3	15.9	15.7	15.3	15.3
Port activities	38.9	37.1	35.2	34.3	34.5	33.5	33.8	35.2	35.2
Shipbuilding and repair	45.6	41.2	37.8	34.2	32.2	32.6	33.1	35.2	35.2
Maritime transport	34.5	32.3	31.8	30.8	28.8	47.8	49.3	49.9	49.9
Blue economy	448.2	416.0	405.0	392.9	366.0	360.6	366.6	395.8	413.1
<i>National employment</i>	<i>22,324</i>	<i>22,152</i>	<i>22,215</i>	<i>22,149</i>	<i>21,755</i>	<i>21,810</i>	<i>21,973</i>	<i>22,241</i>	<i>22,444</i>
Blue economy (% of national jobs)	2.0%	1.9%	1.8%	1.8%	1.7%	1.7%	1.7%	1.8%	1.8%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	6,038	6,393	6,458	5,931	5,405	5,028	5,519	6,416	7,081
Marine living resources	2,380	2,380	2,524	2,195	2,228	2,153	2,548	2,732	2,716
Marine non-living resources	2,450	2,541	2,540	2,101	1,677	1,578	1,764	1,785	1,785
Port activities	1,732	1,922	1,877	1,994	2,047	1,983	2,142	2,194	2,194
Shipbuilding and repair	1,889	1,658	1,837	1,451	1,483	1,730	1,651	2,083	2,085
Maritime transport	2,726	3,812	3,090	2,888	3,006	3,527	4,089	3,906	3,906
Blue economy	17,217	18,705	18,325	16,560	15,847	15,998	17,713	19,116	19,766
<i>National GVA (EUR billion)</i>	<i>1,421.7</i>	<i>1,443.2</i>	<i>1,470.3</i>	<i>1,448.0</i>	<i>1,444.1</i>	<i>1,457.9</i>	<i>1,485.3</i>	<i>1,517.7</i>	<i>1,546.4</i>
Blue economy (% of GVA)	1.2%	1.3%	1.2%	1.1%	1.1%	1.1%	1.2%	1.3%	1.3%

Source: Eurostat, DCF and own calculations.

Italy: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	129.6	106.7	8,172	9,411	3,623	4,323	45.1	67.9	18.5	22.5
	Transport	Transport	24.5	16.6	4,911	4,635	908	983	49.8	82.3	36.8	39.4
	Other expenditure	Other expenditure	82.0	80.1	6,068	6,710	1,507	1,775	44.8	56.4	11.7	13.7
		Small-scale coastal fleet	13.7	12.6	339	217	243	162	24.9	17.0	3.3	2.5
Extraction and commercialization of marine living resources	Capture fisheries	Industrial fleet	15.5	13.1	986	699	600	407	51.5	34.8	18.3	15.0
		Finfish marine aquaculture	0.3	0.7	133	172	26	88	474.6	69.5	33.9	
		Shellfish aquaculture	4.2	5.1	156	201	75	126	21.7	53.6	8.9	11.3
		Freshwater aquaculture	1.4	1.0	337	203	108	83	772.8	449.8	32.6	26.3
Processing and distribution		Processing and preserving of fish, crustaceans and molluscs	5.3	5.7	2,211	2,508	296	403	74.9	95.2	29.6	35.1
		Retail sale of fish, crustaceans and molluscs in specialised stores	11.3	11.6	957	1,101	173	164	63.8	57.2	5.6	7.5
		Wholesale of other food, including fish, crustaceans and molluscs	16.9	20.5	9,007	12,202	636	1,114	58.5	85.1	25.8	27.3
		Prepared meals and dishes	4.5	3.1	697	511	195	130	67.6	65.7	25.0	26.7
Marine extraction of minerals, oil and gas		Manufacture of oils and fats										
		Other food products	0.4	0.5	113	189	29	42	103.0	112.4	28.3	36.8
	Extraction	Extraction of crude petroleum	0.0	0.1	190	130	141	65	4,129.9	1,113.5	99.1	96.8
		Extraction of natural gas	9.2	8.5	41,269	31,887	1,715	1,143	209.5	131.5	81.9	98.8
Maritime transport		Operation of gravel and sand pits; mining of clays and kaolin	9.7	5.9	1,819	1,050	509	374	73.8	88.4	31.0	35.7
	Support activities	Support activities for petroleum and natural gas extraction	0.7	0.8	215	399	85	203	133.8	307.9	76.5	84.3
		Support activities for other mining and quarrying										
		Sea and coastal passenger water transport	16.8	36.7	5,513	5,534	1,839	2,237	114.3	60.7	47.6	27.0
Ports, warehousing and construction of water projects		Sea and coastal freight water transport	11.9	9.7	5,178	5,141	735	1,425	64.9	170.7	54.5	68.0
		Inland freight water transport	0.6	0.6	38	43	17	23	49.4	61.3	21.9	25.9
		Inland passenger water transport	2.5	2.3	138	398	91	114	55.3	97.4	26.8	22.7
		Renting and leasing of water transport equipment	2.7	0.6	290	201	44	107	43.9	332.6	16.7	33.5
Shipbuilding and repair		Cargo handling	13.5	11.5	562	643	314	349	28.8	39.9	22.6	27.9
		Warehousing and storage	2.8	2.9	477	460	138	199	60.1	92.2	30.7	32.6
		Construction of water projects	9.6	6.5	2,754	993	500	351	67.5	70.5	34.4	42.0
		Service activities incidental to water transportation	13.0	14.3	1,867	2,584	780	1,295	80.0	125.0	38.6	45.6
Total Blue Economy		Building of ships and floating structures	19.4	16.8	3,843	5,073	874	1,110	57.5	82.2	38.3	48.1
		Building of pleasure and sporting boats	12.6	7.2	2,811	1,987	457	456	48.7	81.2	34.2	43.3
		Repair and maintenance of ships and boats	10.3	9.1	1,037	901	337	363	50.4	64.5	25.1	26.8
		Manufacture of cordage, rope, twine and netting	0.1	0.1	11	12	2	3	47.9	61.8	21.9	24.8
		Manufacture of textiles other than apparel	0.8	0.5	126	57	26	15	54.8	63.8	20.1	19.8
		Manufacture of sport goods	0.4	0.4	78	126	20	31	66.2	104.6	31.9	39.2
		Manufacture of engines and turbines, except aircraft	1.4	0.8	549	365	140	81	113.5	112.2	54.6	57.0
		Manufacture of instruments for measuring, testing and navigation	0.5	0.3	89	65	33	26	75.2	93.6	46.2	49.8
Total Blue Economy			448.2	413.1	102,938	96,807	17,217	19,766	59.7	74.1	24.4	26.9

Source: Eurostat (SBS), DCF and own calculations.

CYPRUS

The Blue Economy sectors in Cyprus employ over 20,000 people and generate around €623 million in GVA, representing a 3.2% share of the national economy and 5.4% of jobs. The Blue Economy's contributions to both national GDP and employment have remained steady throughout the period of analysis (2009-2017).

As an island state, it is not surprising that Cyprus is dominated by coastal tourism, which contributed 74% of Blue Economy-based jobs and 67% of the GVA in 2016. Employment has remained relatively stable since 2009. The average wage in the Blue Economy in 2017 was €16,700, a 15% drop on the €19 700 reported in 2009.

Cyprus: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	12.1	12.2	11.3	11.1	12.2	12.7	12.1	12.3	14.8
Marine living resources	1.8	2.2	2.2	2.1	2.3	2.2	2.4	2.4	2.4
Marine non-living resources	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Port activities	1.1	1.3	1.4	1.2	0.9	0.8	0.9	0.9	0.9
Shipbuilding and repair	0.1	0.2	0.2	0.3	0.5	0.6	0.9	1.2	1.2
Maritime transport	2.8	3.3	3.1	3.1	3.1	3.1	3.1	0.3	0.3
Blue economy	18.3	19.7	18.8	18.4	19.6	20.1	19.9	17.5	20.1
<i>National employment</i>	<i>371</i>	<i>382</i>	<i>386</i>	<i>375</i>	<i>357</i>	<i>355</i>	<i>350</i>	<i>354</i>	<i>370</i>
Blue economy (% of national jobs)	4.9%	5.2%	4.9%	4.9%	5.5%	5.7%	5.7%	5.0%	5.4%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	319	312	309	309	344	347	338	353	420
Marine living resources	20	21	29	20	28	28	31	35	35
Marine non-living resources	43	43	43	43	43	43	43	43	43
Port activities	85	96	101	91	80	77	80	82	82
Shipbuilding and repair	5	6	8	15	15	22	32	43	43
Maritime transport	96	109	73	73	73	73	73	0	0
Blue economy	569	587	562	550	582	589	595	556	623
<i>National GVA (EUR billion)</i>	<i>16.4</i>	<i>17.0</i>	<i>17.5</i>	<i>17.3</i>	<i>16.1</i>	<i>15.4</i>	<i>15.6</i>	<i>16.2</i>	<i>17.0</i>
Blue economy (% of GVA)	3.5%	3.5%	3.2%	3.2%	3.6%	3.8%	3.8%	3.4%	3.7%

Source: Eurostat, DCF and own calculations.

Cyprus: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	8.3	8.0	411	449	235	265	28.8	33.4	18.4	15.9
	Transport	Transport	1.7	1.9	389	477	39	50	26.7	26.5	31.5	20.7
	Other expenditure	Other expenditure	2.1	4.9	130	310	45	105	27.6	25.2	13.7	11.8
Extraction and commercialization of marine living resources	Capture fisheries	Small-scale coastal fleet	0.8	1.0	7	5	0	1	0.2	2.6		
		Industrial fleet	0.1	0.2	3	4	1	2	3.4	9.5	6.1	6.3
		Finfish marine aquaculture	0.2	0.4	18	42	6	15	25.8	34.3	11.7	10.1
	Aquaculture	Shellfish aquaculture	0.0	0.0	0	0	0	0	8.5	36.5	1.4	2.1
		Freshwater aquaculture	0.1	0.0	1	0	0	0	21.7	21.1	1.8	1.5
		Processing and preserving of fish, crustaceans and molluscs										
	Processing and distribution	Retail sale of fish, crustaceans and molluscs in specialised stores	0.3	0.4	38	47	9	9	35.5	24.4	17.4	13.9
		Wholesale of other food, including fish, crustaceans and molluscs	0.2	0.2	26	35	4	5	24.8	24.0	21.8	23.1
		Prepared meals and dishes	0.1	0.2	4	11	2	3	25.0	27.2	15.3	12.7
		Manufacture of oils and fats										
Marine extraction of minerals, oil and gas	Extraction	Other food products										
		Extraction of crude petroleum										
		Extraction of natural gas										
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	0.5	0.5	79	80	43	43	86.3	85.1	33.9	34.4
		Support activities for petroleum and natural gas extraction										
		Support activities for other mining and quarrying										
		Sea and coastal passenger water transport	2.7	0.2	215	15	102	6	38.7	25.9	17.0	14.8
	Maritime transport	Sea and coastal freight water transport	0.1	0.1	13	13	6	6	93.4	93.4	64.2	64.2
		Inland freight water transport										
		Inland passenger water transport										
Ports, warehousing and construction of water projects	Renting	Renting and leasing of water transport equipment										
		Cargo handling	0.4	0.3	24	14	17	10	61.6	39.1	30.7	26.0
		Warehousing and storage	0.1	0.2	10	19	5	12	53.5	66.5	24.0	24.6
	Water projects	Construction of water projects	0.1	0.1	29	20	10	5	71.4	63.4	35.0	26.4
		Service activities incidental to water transportation	0.4	0.3	61	75	53	54	127.3	167.6	54.0	51.5
	Building of ships	Building of ships and floating structures										
		Building of pleasure and sporting boats	0.0	0.0	2	2	1	1	17.2	30.8	13.8	15.4
		Repair and maintenance of ships and boats	0.1	1.1	10	97	5	43	53.4	37.0	22.1	31.1
	Shipbuilding and repair	Manufacture of cordage, rope, twine and netting										
		Manufacture of textiles other than apparel										
Total Blue Economy	Equipment	Manufacture of sport goods										
	Machinery	Manufacture of engines and turbines, except aircraft										
		Manufacture of instruments for measuring, testing and navigation										

Source: Eurostat (SBS), DCF and own calculations.

LATVIA

The Latvian Blue Economy employs almost 25,000 people and generates around €462 million in GVA. It is dominated by the ports, warehousing and water projects sector, which contributed 25% to jobs and 49% to overall GVA in 2017. The coastal tourism sector is also an important contributor, generating 34% of jobs and 22% of GVA. Overall, the Blue Economy GVA increased by almost 32% compared to 2009. Overall, Blue Economy jobs decreased by 5% compared to 2009. Jobs increased only in the ports, warehousing and water projects sector (+38%) and marine extraction of minerals, oil and gas (13%) while decreasing in all other Blue Economy sectors that were analysed.

The share of the Blue Economy towards national GDP dropped by 8% between 2009 and 2017. The same trend can be observed for employment (3%), where the national and Blue Economy levels have declined and in 2017, were below 2009 levels. The percentage of Blue Economy employment in terms overall employment levels decreased by 3% during the reporting period.

Latvia: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	9.4	8.6	7.9	7.3	6.9	7.4	7.1	7.3	8.4
Marine living resources	7.7	7.9	7.2	7.8	8.1	7.6	6.2	5.8	5.8
Marine non-living resources	0.8	0.7	0.8	0.9	0.9	1.0	1.1	0.9	0.9
Port activities	4.5	4.4	5.2	5.5	5.7	6.2	6.5	6.2	6.2
Shipbuilding and repair	2.7	2.2	2.2	2.5	2.5	2.3	2.4	2.6	2.6
Maritime transport	1.0	1.0	1.0	1.0	1.0	1.0	0.8	0.9	0.9
Blue economy	26.2	24.7	24.3	25.0	25.2	25.5	24.0	23.8	24.9
National employment	877	829	841	852	867	859	868	862	862
Blue economy (% of national jobs)	3.0%	3.0%	2.9%	2.9%	2.9%	3.0%	2.8%	2.8%	2.9%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	86	86	84	77	76	85	82	89	100
Marine living resources	61	67	65	80	91	81	76	68	71
Marine non-living resources	22	22	22	22	22	18	20	16	16
Port activities	128	118	174	201	199	212	225	224	224
Shipbuilding and repair	31	27	27	28	29	30	31	33	33
Maritime transport	21	15	10	7	7	15	18	18	18
Blue economy	349	335	382	414	424	442	453	448	462
National GVA (EUR billion)	16.9	15.8	17.9	19.5	20.1	20.8	21.4	21.8	23.6
Blue economy (% of GVA)	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.0%

Source: Eurostat, DCF and own calculations.

Latvia: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	3.3	2.8	62	83	28	34	10.4	16.8	5.7	7.6
	Transport	Transport	1.7	1.2	168	142	34	27	22.1	27.0	11.8	13.7
	Other expenditure	Other expenditure	4.3	4.4	117	153	24	38	6.5	11.8	4.8	6.4
Extraction and commercialization of marine living resources	Capture fisheries	Small-scale coastal fleet	1.1	0.2	1	1	1	1	2.1	9.1	0.1	0.4
		Industrial fleet	0.6	0.4	21	18	11	8	51.6	37.9	6.1	8.5
		Finfish marine aquaculture										
	Aquaculture	Shellfish aquaculture										
		Freshwater aquaculture	0.1	0.3	2	6	1	3	9.5	16.5	8.6	8.3
		Processing and preserving of fish, crustaceans and molluscs	4.7	3.8	153	153	30	39	7.0	12.1	4.7	6.7
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.1	0.1	2	2	0	0	2.6	4.4	3.5	3.1
		Wholesale of other food, including fish, crustaceans and molluscs	0.8	0.7	151	175	16	17	22.2	29.8	7.5	11.0
		Prepared meals and dishes	0.3	0.3	17	11	3	3	9.1	13.0	4.2	6.7
		Manufacture of oils and fats	0.0	0.0	0	3	-	0	9.2	19.6	8.1	15.3
Marine extraction of minerals, oil and gas		Other food products										
	Extraction	Extraction of crude petroleum										
		Extraction of natural gas										
		Operation of gravel and sand pits; mining of clays and kaolin	0.8	0.9	58	56	22	16	31.9	22.2	7.2	8.8
	Support activities	Support activities for petroleum and natural gas extraction										
		Support activities for other mining and quarrying	0.0	0.0								
		Sea and coastal passenger water transport	0.5	0.4								
		Sea and coastal freight water transport	0.5	0.2	42	33	18	10	41.6	61.1	25.5	26.7
		Inland freight water transport	0.0	0.1	0	8	0	6	9.1	40.9	9.1	25.2
		Inland passenger water transport	0.0	0.0	0	0	0	0	30.0	4.2		2.6
Ports, warehousing and construction of water projects	Renting	Renting and leasing of water transport equipment	0.0	0.1	6	6	2	3	100.0	42.9	52.0	14.4
	Cargo and warehousing	Cargo handling	2.3	2.4	204	222	84	93	39.2	43.9	13.3	15.5
	Water projects	Warehousing and storage	1.2	1.9	57	93	19	37	17.8	22.7	8.5	9.8
		Construction of water projects	0.9	0.6	104	47	20	13	23.4	24.7	11.3	14.2
	Service activities	Service activities incidental to water transportation	0.2	1.3	6	105	4	81	28.9	71.5	15.2	21.8
Shipbuilding and repair	Building of ships	Building of ships and floating structures	0.8	0.7	28	29	10	12	12.4	19.2	8.4	10.0
	Repair	Building of pleasure and sporting boats	0.1	0.4	3	9	2	3	15.1	8.3	7.4	4.9
		Repair and maintenance of ships and boats	1.7	1.3	43	37	19	15	12.2	14.6	5.4	8.6
		Manufacture of cordage, rope, twine and netting	0.0	0.0	0	0	0	0	9.3	12.5	5.2	6.8
	Equipment	Manufacture of textiles other than apparel	0.0	0.2	0	6	0	2	7.1	13.0	4.7	7.2
Total Blue Economy		Manufacture of sport goods	0.0	0.0	0	2	0	0	14.3	20.5	2.5	6.4
		Manufacture of engines and turbines, except aircraft	0.0	0.0	0	0					12.5	12.5
		Manufacture of instruments for measuring, testing and navigation	0.0	0.1	1	3	1	1	27.4	20.2	10.2	12.2

Source: Eurostat (SBS), DCF and own calculations.

LITHUANIA

The Lithuanian Blue Economy employs around 21,800 people and generates around €482 million in GVA. It is dominated by the Living resources sector, which accounted for 36% of jobs and 27% of GVA in 2016. Ports, warehousing and water projects are also a large contributor, generating 30% of GVA while providing 19% of jobs.

Overall, the Blue Economy GVA increased 30% compared to 2009 while its share to the national economy decreased 7%. In 2017, the Blue Economy GVA contributed 1.2% of GVA, down from 1.4% in 2009. Blue Economy-based GVA growth has been on the rise since 2013 and by 2017 was at a higher level than in 2009. Lithuania's national GDP also increased and reached its highest level in 2017. In terms of employment, the Blue Economy has decreased by 3% on 2009, as did its share (4%).

The average wage in 2017 was €12,600, a 24% increase on 2009. Compared to 2009 wages, average wage increased in all Blue Economy sectors.

Lithuania: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	3.3	3.0	2.7	2.5	2.2	2.3	2.3	2.4	2.6
Marine living resources	6.6	6.8	6.6	6.8	7.4	7.7	8.1	7.8	7.9
Marine non-living resources	1.1	0.9	1.1	1.1	1.1	1.2	1.2	1.2	1.2
Port activities	3.9	3.5	3.9	3.8	4.0	4.0	3.9	4.0	4.0
Shipbuilding and repair	6.0	4.3	4.4	4.3	4.7	4.6	4.5	4.8	4.8
Maritime transport	1.8	1.8	1.8	1.6	1.6	1.5	1.4	1.3	1.3
Blue economy	22.5	20.4	20.5	20.1	20.8	21.4	21.4	21.6	21.8
<i>National employment</i>	<i>1,290</i>	<i>1,224</i>	<i>1,226</i>	<i>1,244</i>	<i>1,264</i>	<i>1,288</i>	<i>1,301</i>	<i>1,318</i>	<i>1,306</i>
Blue economy (% of national jobs)	1.7%	1.7%	1.7%	1.6%	1.6%	1.7%	1.6%	1.6%	1.7%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	23	23	26	24	22	23	28	32	35
Marine living resources	84	76	96	95	103	135	121	138	130
Marine non-living resources	16	18	27	25	36	34	34	40	40
Port activities	113	106	129	145	130	149	148	144	144
Shipbuilding and repair	77	79	56	40	53	68	85	96	96
Maritime transport	57	57	58	34	34	34	46	37	37
Blue economy	370	358	391	363	377	442	461	488	482
<i>National GVA (EUR billion)</i>	<i>24.3</i>	<i>25.2</i>	<i>28.2</i>	<i>30.2</i>	<i>31.7</i>	<i>33.1</i>	<i>33.7</i>	<i>35.0</i>	<i>37.9</i>
Blue economy (% of GVA)	1.5%	1.4%	1.4%	1.2%	1.2%	1.3%	1.4%	1.4%	1.3%

Source: Eurostat, DCF and own calculations.

Lithuania: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	1.6	1.3	29	38	12	19	9.6	19.2	5.7	7.3
	Transport	Transport	0.6	0.4	52	52	6	9	11.0	22.3	8.5	11.3
	Other expenditure	Other expenditure	1.1	0.8	29	29	5	7	5.9	10.9	4.7	6.6
	Capture fisheries	Small-scale coastal fleet	0.2	0.1	1	1	1	1	9.1	14.6	0.6	2.9
Extraction and commercialization of marine living resources	Capture fisheries	Industrial fleet	0.6	0.5	60	59	14	6	29.0	17.3	10.5	13.2
		Finfish marine aquaculture										
	Aquaculture	Shellfish aquaculture										
		Freshwater aquaculture	0.1	0.1	7	13	2	4	45.9	44.3	16.2	13.3
		Processing and preserving of fish, crustaceans and molluscs	4.2	5.2	233	518	50	75	12.8	15.1	7.2	10.2
	Processing and distribution	Retail sale of fish, crustaceans and molluscs in specialised stores	0.0	0.1	0	3	0	0	13.8			5.5
		Wholesale of other food, including fish, crustaceans and molluscs	1.1	1.1	166	408	14	32	14.3	34.4	7.9	11.9
		Prepared meals and dishes	0.4	0.8	9	36	4	11	11.0	15.4	5.2	7.7
		Manufacture of oils and fats										
		Other food products	0.0	0.0	0	0	0	0	11.7	18.0	4.3	8.9
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum										
		Extraction of natural gas										
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	1.1	1.2	35	94	16	40	16.1	36.0	11.9	13.7
		Support activities for petroleum and natural gas extraction										
		Support activities for other mining and quarrying										
Maritime transport	Sea and coastal water transport											
	Sea and coastal passenger water transport	1.6	1.1	147	132	53	30	33.2	27.0	17.2	24.0	
	Inland water transport											
	Inland freight water transport											
Ports, warehousing and construction of water projects	Renting	Inland passenger water transport	0.1	0.1	4	5	3	3	29.3	30.0	10.5	11.5
		Renting and leasing of water transport equipment	0.0	0.1	2	61	1	4	38.5	72.9	3.1	11.4
	Cargo and warehousing	Cargo handling	1.0	1.0	60	100	33	46	34.0	47.1	14.7	20.7
		Warehousing and storage	1.1	1.9	47	112	20	32	20.7	18.2	9.5	11.5
	Water projects	Construction of water projects	1.1	0.6	46	22	16	6	14.6	10.7	10.8	11.8
		Service activities incidental to water transportation	0.7	0.5	56	80	45	60	70.6	115.5	16.7	22.0
Shipbuilding and repair	Building of ships	Building of ships and floating structures	1.7	1.2	55	70	33	25	20.0	21.5	15.9	15.4
		Building of pleasure and sporting boats	0.2	0.3	6	13	1	4	7.3	16.7	9.6	13.7
	Repair	Repair and maintenance of ships and boats	3.5	2.8	196	171	36	57	11.2	21.9	10.8	14.0
		Manufacture of cordage, rope, twine and netting	0.4	0.3	18	16	5	6	12.8	19.3	7.5	11.4
	Equipment	Manufacture of textiles other than apparel	0.2	0.1	4	4	1	1	9.6	13.5	5.7	8.4
		Manufacture of sport goods	0.0	0.0	1	1	0	0	9.0	14.8	4.7	5.6
Machinery	Machinery	Manufacture of engines and turbines, except aircraft	0.0	0.0	0	0	0	0	10.5	12.5	8.3	10.0
		Manufacture of instruments for measuring, testing and navigation	0.0	0.1	1	6	1	2	24.3	33.8	11.2	17.3
Total Blue Economy			22.5	21.8	1,263	2,044	370	482	18.1	24.2	10.1	12.6

Source: Eurostat(SBS), DCF and own calculations.

LUXEMBOURG

Blue growth is not just for coastal states. Landlocked states have the opportunity to develop and grow their own blue economies. In Luxembourg, the Blue Economy employs just around 69 persons but generates around €5.9 million in GVA, mainly due to ports, warehousing and water projects.

Luxembourg: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism									
Marine living resources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marine non-living resources									
Port activities	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Shipbuilding and repair									
Maritime transport									
Blue economy	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
National employment	215	219	222	234	236	243	255	259	270
Blue economy (% of national jobs)	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism									
Marine living resources	0	0	0	0	0	0	0	0	0
Marine non-living resources									
Port activities	6	6	6	5	5	5	5	5	5
Shipbuilding and repair									
Maritime transport									
Blue economy	6	7	6	6	6	6	6	6	6
National GVA (EUR billion)	33.1	36.1	38.7	39.4	41.5	44.4	46.6	48.3	50.2
Blue economy (% of GVA)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Eurostat, DCF and own calculations.

Luxembourg: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation										
	Transport	Transport										
	Other expenditure	Other expenditure										
Extraction and commercialization of marine living resources	Capture fisheries	Small-scale coastal fleet										
		Industrial fleet										
		Finfish marine aquaculture										
	Aquaculture	Shellfish aquaculture										
		Freshwater aquaculture										
		Processing and preserving of fish, crustaceans and molluscs										
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.0	0.0	2	2	0	0	30.0	44.4	23.1	36.4
	Processing and distribution	Wholesale of other food, including fish, crustaceans and molluscs										
		Prepared meals and dishes										
		Manufacture of oils and fats										
Marine extraction of minerals, oil and gas		Other food products										
		Extraction of crude petroleum										
	Extraction	Extraction of natural gas										
		Operation of gravel and sand pits; mining of clays and kaolin										
	Support activities	Support activities for petroleum and natural gas extraction										
Maritime transport		Support activities for other mining and quarrying										
	Sea and coastal water transport	Sea and coastal passenger water transport										
		Sea and coastal freight water transport										
	Inland water transport	Inland freight water transport										
		Inland passenger water transport										
	Renting	Renting and leasing of water transport equipment										
Ports, warehousing and construction of water projects	Cargo and warehousing	Cargo handling	0.1	0.1	12	11	6	5	116.0	102.8	44.5	49.6
		Warehousing and storage										
	Water projects	Construction of water projects										
	Service activities	Service activities incidental to water transportation										
	Building of ships	Building of ships and floating structures										
Shipbuilding and repair		Building of pleasure and sporting boats										
	Repair	Repair and maintenance of ships and boats										
		Manufacture of cordage, rope, twine and netting										
	Equipment	Manufacture of textiles other than apparel										
		Manufacture of sport goods										
Total Blue Economy		Manufacture of engines and turbines, except aircraft										
	Machinery	Manufacture of instruments for measuring, testing and navigation										
Total Blue Economy			0.1	0.1	13	13	6	6	102.4	94.4	42.3	47.4

Source: Eurostat (SBS), DCF and own calculations.

HUNGARY

As Hungary is a landlocked country, the Blue Economy is not a main contributor to its economy as a whole. In terms of GVA, its share was around 0.3% in 2017, a 15% decrease since 2009. The Blue Economy sectors account for 0.3% of jobs, a 32% increase since 2009. It is worth mentioning that Blue Economy jobs have outperformed the national levels compared to 2009: Blue Economy jobs grew 56% against 18% for national employment, while in terms of GVA growth the opposite patterns were observed, with the Blue Economy's GVA growing by 12% against 32% for domestic GDP.

Hungary: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism									
Marine living resources	2.6	2.4	2.4	2.8	3.0	3.3	3.2	3.4	3.4
Marine non-living resources	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Port activities	6.2	6.1	9.2	11.1	8.4	10.5	9.3	8.7	8.7
Shipbuilding and repair	0.9	0.8	0.6	0.5	0.7	1.8	3.3	3.5	3.7
Maritime transport	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.9	0.9
Blue economy	10.8	10.5	13.4	15.6	13.2	16.7	16.8	16.7	16.8
National employment	3,717	3,701	3,724	3,793	3,860	4,070	4,176	4,309	4,373
Blue economy (% of national jobs)	0.3%	0.3%	0.4%	0.4%	0.3%	0.4%	0.4%	0.4%	0.4%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism									
Marine living resources	48	45	46	46	55	59	68	83	83
Marine non-living resources	7	1	2	1	1	2	3	4	4
Port activities	243	274	277	258	262	284	225	180	180
Shipbuilding and repair	14	15	11	9	13	35	72	72	73
Maritime transport	9	9	8	17	19	15	18	19	19
Blue economy	321	345	344	333	349	394	386	357	359
National GVA (EUR billion)	80.1	83.7	86.1	83.6	86.0	89.0	93.2	96.3	105.0
Blue economy (% of GVA)	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%

Source: Eurostat, DCF and own calculations.

Hungary: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation										
	Transport	Transport										
	Other expenditure	Other expenditure										
Extraction and commercialization of marine living resources	Capture fisheries	Small-scale coastal fleet										
		Industrial fleet										
		Finfish marine aquaculture										
	Aquaculture	Shellfish aquaculture										
		Freshwater aquaculture	0.2	0.4	29	34	7	11	45.8	44.3	16.1	13.4
		Processing and preserving of fish, crustaceans and molluscs	0.1	0.0	5	1	1	0	8.6	12.5	6.4	
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.2	0.2	4	7	1	1	4.8	7.5	2.4	2.7
		Wholesale of other food, including fish, crustaceans and molluscs	2.0	2.6	415	539	36	68	20.7	29.3	9.4	11.6
	Processing and distribution	Prepared meals and dishes	0.1	0.1	9	9	2	2	23.8	23.2	11.6	10.5
		Manufacture of oils and fats	0.0	0.0	4	4	1	0	131.2	55.7	22.1	24.5
Marine extraction of minerals, oil and gas		Other food products	0.0	0.0	1	1	0	0	19.1	30.0	7.8	12.6
		Extraction of crude petroleum										
	Extraction	Extraction of natural gas										
		Operation of gravel and sand pits; mining of clays and kaolin										
		Support activities for petroleum and natural gas extraction										
	Support activities	Support activities for other mining and quarrying	0.1	0.2	15	10	7	4	82.0	26.9	6.9	10.9
		Sea and coastal passenger water transport	0.0	0.0	1	4	0		8.3		7.1	
		Sea and coastal freight water transport	0.1	0.0	3	1	2	0	29.8	33.3	25.0	12.5
	Inland water transport	Inland freight water transport	0.3	0.1	54	51	0	2	0.4	21.3	11.8	13.2
		Inland passenger water transport	0.6	0.7	13	20	7	10	12.6	16.8	8.4	9.0
Ports, warehousing and construction of water projects	Renting	Renting and leasing of water transport equipment	0.1	0.1	2	11	1	7	14.0	172.5	2.7	3.6
	Cargo and warehousing	Cargo handling	1.2	1.7	45	122	15	29	15.7	20.2	8.0	9.7
	Water projects	Warehousing and storage	2.6	4.0	469	300	196	135	80.1	35.5	12.4	13.4
	Service activities	Construction of water projects	1.9	2.6	136	57	25	9	14.5	3.5	9.5	5.9
		Service activities incidental to water transportation	0.4	0.4	64	18	7	8	17.6	24.4	9.5	7.7
		Building of ships and floating structures	0.1	0.1	3	4	0	2	7.1	14.9	5.6	5.7
		Building of pleasure and sporting boats	0.2	0.2	6	6	2	2	10.8	11.8	6.8	5.2
	Repair	Repair and maintenance of ships and boats	0.1	0.1	4	2	1	1	8.8	10.6	6.7	5.1
		Manufacture of cordage, rope, twine and netting	0.0	0.0	1	1	0	0	9.9	17.1	9.1	8.6
	Equipment	Manufacture of textiles other than apparel	0.0	0.6	0	13	0	3	8.4	6.9	5.6	5.4
Shipbuilding and repair		Manufacture of sport goods	0.0	0.0	1	1	0	0	21.1	29.6	8.5	10.3
		Manufacture of engines and turbines, except aircraft	0.0	0.0	5	8	2	2	103.7	56.1	16.8	18.5
	Machinery	Manufacture of instruments for measuring, testing and navigation	0.4	2.7	24	216	9	63	23.1	25.8	12.9	14.3
Total Blue Economy			10.8	16.8	1,312	1,439	321	359	33.9	24.0	10.0	10.7

Source: Eurostat (SBS), DCF and own calculations.

MALTA

The Maltese Blue Economy employs over 12,700 people and generates €344 million in GVA. As an island state, it is clearly dominated by the coastal tourism sector, which contributed 77% to the total of Blue Economy jobs and 67% to GVA in 2017. Living resources is also an important contributor to Blue Economy jobs (15% of the total) while brings in 11% of the GVA.

Although the percentage that the Blue Economy contributes to national GDP fell by 16% compared to 2009, the Blue Economy GVA has increased by 55% and hit its highest in 2017 for the reporting period. In addition, Malta's national GDP sharply rose between 2009 and 2017 by 84%. Trends for employment differ in that; overall, employment has risen by 37% in recent years while Blue Economy jobs have fallen (7%). Moreover, the percentage of employment that the Blue Economy contributes in Malta fell by 32% in 2009-2017. Average wage in 2017 was €12,900, a 28% increase since 2009.

Malta: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	10.8	9.4	9.5	9.6	8.8	9.7	7.9	8.9	9.7
Marine living resources	1.9	2.0	1.7	1.9	1.9	2.1	2.2	2.0	1.9
Marine non-living resources	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Port activities	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Shipbuilding and repair	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Maritime transport	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
Blue economy	13.7	12.5	12.4	12.7	11.9	12.9	11.2	12.0	12.7
<i>National employment</i>	<i>158</i>	<i>160</i>	<i>164</i>	<i>171</i>	<i>179</i>	<i>187</i>	<i>194</i>	<i>205</i>	<i>217</i>
Blue economy (% of national jobs)	8.7%	7.8%	7.5%	7.4%	6.7%	6.9%	5.8%	5.9%	5.9%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	170	168	171	172	159	174	175	208	231
Marine living resources	-	1	33	36	20	39	34	40	38
Marine non-living resources	3	2	2	2	2	2	2	2	2
Port activities	37	34	34	34	34	34	34	34	34
Shipbuilding and repair	12	9	9	9	9	9	9	9	9
Maritime transport	2	5	5	5	5	5	30	30	30
Blue economy	222	252	257	242	247	258	290	320	344
<i>National GVA (EUR billion)</i>	<i>5.4</i>	<i>5.8</i>	<i>6.0</i>	<i>6.3</i>	<i>6.7</i>	<i>7.5</i>	<i>8.5</i>	<i>9.2</i>	<i>10.0</i>
Blue economy (% of GVA)	4.2%	4.3%	4.3%	3.9%	3.7%	3.4%	3.4%	3.5%	3.4%

Source: Eurostat, DCF and own calculations.

Malta: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	6.9	5.6	279	355	123	165	22.3	36.9	12.3	16.5
	Transport	Transport	0.5	0.5	159	179	10	14	39.3	40.1	7.1	10.5
	Other expenditure	Other expenditure	3.4	3.6	155	205	36	53	18.0	25.6	6.5	8.4
	Capture fisheries	Small-scale coastal fleet	0.9	0.9	2	4	1	2	1.3	3.4	0.2	1.1
Extraction and commercialization of marine living resources	Aquaculture	Industrial fleet	0.3	0.2	8	6	4	3	20.4	11.5	4.5	2.8
		Finfish marine aquaculture	0.2	0.2	48	163	20	18	137.7	82.2	21.2	17.1
		Shellfish aquaculture										
		Freshwater aquaculture		0.0	5	1	3	0		106.7		16.7
Processing and distribution		Processing and preserving of fish, crustaceans and molluscs										
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.1	0.1	16	24	2	1	35.7	33.3	6.5	6.5
		Wholesale of other food, including fish, crustaceans and molluscs	0.4	0.5	115	135	12	14	33.0	35.6	13.1	16.2
		Prepared meals and dishes										
Marine extraction of minerals, oil and gas		Manufacture of oils and fats										
		Other food products										
	Extraction	Extraction of crude petroleum										
		Extraction of natural gas										
Maritime transport	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	0.1	0.1	8	6	3	2	27.1	18.3	10.1	11.1
		Support activities for petroleum and natural gas extraction										
		Support activities for other mining and quarrying										
	Sea and coastal water transport	Sea and coastal passenger water transport										
Ports, warehousing and construction of water projects	Cargo and warehousing	Sea and coastal freight water transport	0.1	0.1							17.4	23.1
	Water projects	Inland freight water transport										
	Service activities	Inland passenger water transport	0.0									
		Renting and leasing of water transport equipment	0.1	0.0	5	42	2	30				
Shipbuilding and repair	Building of ships	Cargo handling										
	Repair	Warehousing and storage	0.2	0.2	30	30	15	15	83.5	90.6	13.9	34.3
	Equipment	Construction of water projects										
	Machinery	Service activities incidental to water transportation	0.3	0.3	40	32	22	20	95.7	84.4	21.8	23.7
Total Blue Economy		Building of ships and floating structures			1		0		75.0			
		Building of pleasure and sporting boats	0.0	0.0								
		Repair and maintenance of ships and boats	0.3	0.4	19	27	12	9	53.3	28.9	14.8	14.2
		Manufacture of cordage, rope, twine and netting										
Total Blue Economy		Manufacture of textiles other than apparel										
		Manufacture of sport goods										
		Manufacture of engines and turbines, except aircraft										
		Manufacture of instruments for measuring, testing and navigation										
Total Blue Economy			13.7	12.7	889	1,209	222	344	22.2	34.8	10.1	12.9

Source: Eurostat (SBS), DCF and own calculations.

NETHERLANDS¹⁵²

The Dutch Blue Economy employs over 127,800 people and generates around €10.3 billion in GVA. Ports, warehousing and water projects and marine extraction of minerals oil and gas are the main contributors, generating 40% and 19% of the GVA respectively. Employment is more evenly distributed among the Blue Economy sectors, apart from offshore oil and gas, which provides only 1.9% of jobs.

The Dutch Blue Economy GVA has seen a 5% decrease in the period 2009-2017 and its contributions to national GDP in terms of percentage was 19% lower in 2017 compared to 2009. In terms of employment, national employment was relatively stable for the reporting period, whereas Blue Economy jobs increased by 6%, peaking in 2017. Furthermore, the Blue Economy's share for national employment grew by 7% between 2009 and 2016. Average wage in 2016 was €46,900, a 17% increase on 2009.

Netherlands: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	30.8	29.9	29.0	28.2	29.5	28.8	27.6	31.6	32.9
Marine living resources	17.4	17.8	17.5	17.9	18.1	18.4	19.2	20.0	19.9
Marine non-living resources	2.4	2.4	2.5	2.5	2.5	2.6	2.5	2.5	2.5
Port activities	26.7	27.1	28.6	29.1	29.8	30.9	31.2	32.1	32.1
Shipbuilding and repair	17.5	16.8	17.4	17.4	17.5	17.5	18.0	17.8	17.8
Maritime transport	25.5	23.4	23.6	26.5	26.9	24.2	23.9	22.5	22.5
Blue economy	120.4	117.4	118.6	121.5	124.4	122.4	122.4	126.5	127.8
National employment	8,443	8,227	8,152	8,174	8,104	8,028	8,115	8,223	8,376
Blue economy (% of national jobs)	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	825	825	842	831	844	874	868	868	1,056
Marine living resources	819	942	894	913	940	985	1,036	1,183	1,145
Marine non-living resources	3,725	3,736	3,875	4,262	4,085	3,432	2,943	1,924	1,924
Port activities	3,307	3,439	3,591	3,647	3,713	3,987	4,163	4,066	4,066
Shipbuilding and repair	787	1,228	987	884	1,053	1,039	997	731	731
Maritime transport	1,300	1,035	957	995	1,336	1,483	1,694	1,350	1,350
Blue economy	10,763	11,205	11,145	11,531	11,970	11,799	11,701	10,275	10,272
National GVA (EUR billion)	561.2	574.3	586.0	590.3	595.7	604.8	620.8	634.8	660.4
Blue economy (% of GVA)	1.9%	2.0%	1.9%	2.0%	2.0%	2.0%	1.9%	1.6%	1.6%

Source: Eurostat, DCF and own calculations.

Notes: The total value of the Dutch Blue Economy is underestimated because the data for sea and coastal passenger water transport as well as on inland water transport were not available.

152. National reporting by

Netherlands on its ocean economy differs due to the lack of EUROSTAT data stemming from confidentiality issues.

152. National reporting by Netherlands on its ocean economy differs due to the lack of EUROSTAT data stemming from confidentiality issues.

BOX 8 MONITORING OF THE BLUE ECONOMY BY DUTCH AUTHORITIES

For more than 10 years, the Dutch ministry of Infrastructure and Water Management has commissioned the development of economic indicators for, on the one hand, the maritime cluster and, on the other, the seaports. This is translated into two reports: the *Maritime Monitor* and the *Port Monitor*. These economic indicators are used by the government for policy analysis and by the industry to have information about the economic significance of the cluster and its maritime sectors, developments of the labour market and innovation. In addition, the monitors serve as input for more scientific studies and cluster analysis.

The *Maritime Monitor* combines a top-down approach based on NACE codes and Statistics Netherlands with a bottom-up approach to grasp the subsectors that are not properly identified through the statistical classification. The following sectors are considered:

Industry sectors making use of vessels for commercial purposes for transportation (shipping, inland shipping and the navy), for the exploitation of the sea (fishing and offshore) or for waterworks at sea (dredging) **Shipbuilding** and **maritime technology** related sectors (maritime equipment supply and yacht building) **Companies** and other bodies **providing services** to the above-mentioned sectors needing specific maritime knowledge (maritime services, ports logistics companies and water sports -leisure- related activities).

Some of these sectors, e.g. maritime equipment manufacturers, might also work for other, non-maritime, industries. The Maritime Monitor provides data on the latest (socio-) economic indicators of the maritime cluster as well as the multiannual trends. Over the years, the Maritime Monitor has refined its methodology and scope to become a best in class example of cluster performance monitoring. According to the latest figures, the Dutch maritime cluster directly generated €18.5 billion and 167,000 employments.

The *Port Monitor* focuses on Dutch Seaports but with a broader definition of port related activities than the one used in the Maritime Monitor. The Port Monitor takes into account three categories of economic activity. First, economic activities related to the transport function of the port, like transshipment, storage of goods and planning of transport. Second, the economic activities directly related to the transport of goods by rail, road, inland shipping and pipeline. Third, the activities of the companies established in seaports with a direct relation to them, such as the petrochemical industry, agricultural processing plants and shipyards. According to the latest figures, the Dutch port related activities directly generated €27.9 billion and 184,000 employments.

The Maritime Monitor has a wider geographical scope as it takes into account the whole of the Netherlands to include maritime companies with locations in industrial inland areas. The report uses data compiled by Statistics Netherlands. In addition, data for large companies (i.e. with more than 100 FTE) are monitored individually with the collaboration of sector organizations. Employment figures are gathered by the Chamber of Commerce (annual reports) and (regional) business statistics.

The importance of innovation: The entire maritime cluster is extremely aware of the necessity to innovate to keep its leading position in relevant sectors. The cooperation between the cluster, government and leading knowledge- and research institutes like Imares, MARIN, NIOZ, NLDA, TNO and maritime and offshore parts of the Technical University Delft is very intense (the triple helix). Various activities and initiatives are taken to further intensify and extend this. With an estimated value of 4% of turnover, the R&D efforts of the maritime cluster is significantly higher compared to that of the average Dutch economy (1.5 %).

Netherlands: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand			Turnover EUR million			GVA EUR million			GVA per FTE EUR thousand			Empl. Compensation EUR thousand		
			2009	2017		2009	2017		2009	2017		2009	2017		2009	2017	
Coastal tourism	Accommodation	Accommodation	20.7	19.3		909	1,160	405	533	34.6	46.9	13.3	15.6				
	Transport	Transport	0.8	0.7		1,103	1,081	242	238	462.2	530.5	216.4	240.6				
	Other expenditure	Other expenditure	9.3	12.9		637	922	178	286	42.6	47.1	11.8	13.4				
Extraction and commercialization of marine living resources	Capture fisheries	Small-scale coastal fleet	0.3	0.3		6	3	4	2	15.8	20.4	2.0	0.3				
		Industrial fleet	1.8	1.7		367	443	149	244	85.9	152.4	51.0	74.7				
		Finfish marine aquaculture															
		Shellfish aquaculture	0.2	0.3		65	64	36	35	169.2	172.4	35.2	54.4				
		Freshwater aquaculture	0.3	0.2		33	26	4	9	20.5	60.2	3.2	1.4				
		Processing and preserving of fish, crustaceans and molluscs	3.3	3.2		677	965	139	167	59.9	76.4	24.8	32.1				
		Retail sale of fish, crustaceans and molluscs in specialised stores	3.9	4.6													
		Wholesale of other food, including fish, crustaceans and molluscs	7.2	9.3		3,897	6,454	489	688	92.6	99.6	36.3	38.9				
	Processing and distribution	Prepared meals and dishes	0.4	0.3													
		Manufacture of oils and fats	0.0	0.0													
Marine extraction of minerals, oil and gas		Other food products	0.0	0.0													
		Extraction of crude petroleum	0.3	0.4		9,618	4,896	2,388	1,091	9,064.0	3,141.2	321.3	385.5				
		Extraction of natural gas	0.6	0.7		3,838	1,954	953	436	1,697.5	658.6	60.3	81.4				
		Operation of gravel and sand pits; mining of clays and kaolin	0.9	0.7		614	549	189	142	231.7	216.9	60.3	73.7				
		Support activities for petroleum and natural gas extraction	0.7	0.7		521	825	194	255	305.7	394.3	94.5	150.9				
	Support activities	Support activities for other mining and quarrying		0.0			1		0				140.0				
		Sea and coastal passenger water transport	1.7	1.7													
		Sea and coastal freight water transport	9.9	7.0		4,636	5,149	1,300	1,350	250.8	237.1	34.4	66.2				
		Inland freight water transport	10.6	10.1													
		Inland passenger water transport	3.2	3.3													
Ports, warehousing and construction of water projects		Renting and leasing of water transport equipment	0.2	0.4													
		Cargo handling	8.2	8.8		1,741	2,262	805	931	109.6	121.6	55.3	65.0				
		Warehousing and storage	8.4	10.3		2,509	2,892	940	1,242	125.5	133.3	60.9	59.0				
		Construction of water projects	6.2	8.6		1,671	1,306	821	850	149.2	110.4	71.9	71.2				
		Service activities incidental to water transportation	3.9	4.5		1,147	1,499	742	1,043	250.7	328.6	66.9	56.9				
		Building of ships and floating structures	6.5	6.0		2,356	2,227	393	365	65.8	65.8	42.4	51.5				
		Building of pleasure and sporting boats	5.4	5.3		2,356	2,227	393	365	93.7	85.8	50.6	58.5				
		Repair and maintenance of ships and boats	4.8	6.2													
		Manufacture of cordage, rope, twine and netting	0.1	0.0													
		Manufacture of textiles other than apparel	0.2	0.1													
Shipbuilding and repair		Manufacture of sport goods	0.1	0.1													
		Manufacture of engines and turbines, except aircraft	0.3	0.1													
		Manufacture of instruments for measuring, testing and navigation	0.1	0.0													
		Manufacture of instruments for measuring, testing and navigation	0.1	0.0													
Total Blue Economy			120.4	127.8		38,700	36,906	10,763	10,272	160.0	137.6	40.2	46.9				

Source: Eurostat (SBS), DCF and own calculations.

Notes: The total value of the Dutch Blue Economy is underestimated because the data for sea and coastal passenger water transport as well as on inland water transport were not available.

AUSTRIA

Despite being a landlocked country, Austria has established a modest but competitive maritime industry, focusing on high quality aquaculture production and related value added activities, as well as seaborne shipping and trade (with block trains operating to two cargo gateways, one in the north and another in the Adriatic).

The Austrian Blue Economy employs 6,269 people (+22% on 2009) and generates around €499 million in GVA (+55% on 2009). Living resources produced €171 million in GVA and provided over 2,823 jobs in 2017. Ports, warehousing and water projects produced 1 513 jobs and generated €193 million in GVA. Shipping and shipbuilding accounted for a further 1,332 jobs, and a GVA of €93 million.

While the Blue Economy in Austria only represents 0.13% of the national GDP, its share has increased by 14% since 2009, outperforming the increase in the national GDP. In terms of employment, the Blue Economy's share has increased gradually, standing at 0.15% in 2017 and outpacing national employment growth; Blue Economy jobs in 2017 increased 14% compared to 2009, against 7% for national jobs.

Austria: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism									
Marine living resources	2.2	2.4	2.4	2.7	2.7	2.9	2.8	2.8	2.8
Marine non-living resources	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Port activities	1.2	1.2	1.1	1.2	1.3	1.5	1.5	1.5	1.5
Shipbuilding and repair	1.1	1.1	1.2	1.1	1.1	1.1	1.1	1.2	1.3
Maritime transport	0.6	0.5	0.6	0.5	0.5	0.6	0.6	0.6	0.6
Blue economy	5.1	5.3	5.3	5.4	5.7	6.2	6.1	6.1	6.3
National employment	3,909	3,944	3,982	4,013	4,030	4,034	4,068	4,143	4,185
Blue economy (% of national jobs)	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism									
Marine living resources	141	144	149	150	157	165	169	171	171
Marine non-living resources	-	0	0	1	2	2	2	2	2
Port activities	96	91	111	172	487	254	199	193	193
Shipbuilding and repair	49	72	67	69	68	71	80	82	93
Maritime transport	37	39	44	37	30	40	40	40	40
Blue economy	323	347	372	429	743	533	490	488	499
National GVA (EUR billion)	256.7	263.6	276.4	283.5	288.6	297.2	307.0	317.6	329.9
Blue economy (% of GVA)	0.1%	0.1%	0.1%	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%

Source: Eurostat, DCF and own calculations.

Austria: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation										
	Transport	Transport										
	Other expenditure	Other expenditure										
Extraction and commercialization of marine living resources	Capture fisheries	Small-scale coastal fleet										
		Industrial fleet										
		Finfish marine aquaculture										
		Shellfish aquaculture										
		Freshwater aquaculture	0.1	0.3	15	24	4	8	45.8	44.3	16.2	13.4
		Processing and preserving of fish, crustaceans and molluscs	0.1	0.2	34	47	10	12	81.7	92.7	31.5	37.3
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.2	0.3	17	22	3	4	24.1	34.4	15.9	15.7
		Wholesale of other food, including fish, crustaceans and molluscs	1.7	1.9	1,050	1,235	119	134	83.0	85.1	44.6	50.8
	Processing and distribution	Prepared meals and dishes	0.1	0.3	17	40	5	14	57.2	59.6	36.4	38.7
		Manufacture of oils and fats										
Marine extraction of minerals, oil and gas		Other food products										
		Extraction of crude petroleum										
		Extraction of natural gas										
		Operation of gravel and sand pits; mining of clays and kaolin										
		Support activities for petroleum and natural gas extraction										
	Support activities	Support activities for other mining and quarrying	0.0	0.0	1	5	0	2	13.3	77.4	72.2	36.6
		Sea and coastal passenger water transport										
		Sea and coastal freight water transport										
		Inland freight water transport	0.2	0.1	79	48	10	2	62.7	39.7	53.4	46.9
		Inland passenger water transport	0.4	0.5	43	61	15	29	54.2	92.4	26.7	27.9
Ports, warehousing and construction of water projects		Renting and leasing of water transport equipment	0.0	0.0	16	21	13	13	2,150.0	1,007.7	15.0	20.7
		Cargo handling	0.0	0.0	1	2	0	1	50.0	46.9	12.5	12.7
		Warehousing and storage	0.7	1.1	175	421	78	178	120.3	187.4	41.6	46.9
		Construction of water projects	0.4	0.3	69	42	10	1	38.4	4.9	22.2	16.8
		Service activities incidental to water transportation	0.1	0.1	14	22	8	14	140.7	201.4	41.7	51.6
		Building of ships and floating structures										
		Building of pleasure and sporting boats	0.2	0.3	28	43	7	19	39.5	87.0	33.2	37.9
		Repair and maintenance of ships and boats	0.2	0.2	22	31	9	13	62.2	89.7	40.7	51.6
		Manufacture of cordage, rope, twine and netting	0.0	0.0	1	4	0	1	51.1	111.3	23.1	52.2
		Manufacture of textiles other than apparel	0.2	0.2	29	31	9	11	49.4	65.9	29.5	36.1
Shipbuilding and repair		Manufacture of sport goods	0.2	0.2	38	38	8	12	47.7	77.3	43.8	54.8
		Manufacture of engines and turbines, except aircraft	0.3	0.5	55	107	13	36	47.6	75.9	57.5	64.3
		Manufacture of instruments for measuring, testing and navigation	0.0	0.0	4	2	2	1	77.1	105.5	48.1	57.7
Total Blue Economy			5.1	6.3	1,710	2,244	323	499	76.2	99.9	38.3	42.6

Source: Eurostat (SBS), DCF and own calculations.

POLAND

The Polish Blue Economy employs 162,000 people and generates over €3.3 billion in GVA. It is dominated by the coastal tourism sector, which contributed 27% of Blue Economy jobs and 20% to GVA in 2017. The ports, warehousing and water projects, the Living resources and the Shipbuilding sectors are also important contributors to the Blue Economy, providing 18%, 23% and 14% of the jobs and 20%, 16% and 17% of the GVA in 2017 respectively.

Although Poland's national GDP growth has been rising by 47%, growth in Blue Economy GVA has been sluggish (8%). At 0.71% in 2017, the share of Blue Economy GVA to national GDP fell 27% compared to 2009. Blue Economy employment also decreased over the reporting period picking up slightly in 2015. While national employment grew by almost 3%, Blue Economy jobs fell 7% compared to 2009. Average wage in the Polish Blue Economy sectors in 2017 was €10,500, a 23% increase on 2009.

Poland: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	70.7	57.3	51.7	53.4	50.1	32.2	36.4	38.4	43.8
Marine living resources	28.4	26.9	25.6	31.3	31.9	35.8	36.6	38.2	38.1
Marine non-living resources	14.3	16.6	17.7	19.0	21.1	21.8	24.6	23.8	23.8
Port activities	28.0	27.8	28.2	28.7	30.2	28.7	27.8	29.2	29.2
Shipbuilding and repair	29.3	23.5	22.0	21.2	21.1	21.2	22.1	23.4	23.3
Maritime transport	3.8	3.8	3.8	3.5	3.4	3.9	3.9	3.8	3.8
Blue economy	174.5	156.0	149.0	157.0	157.8	143.5	151.3	156.8	162.0
<i>National employment</i>	<i>15,629</i>	<i>15,233</i>	<i>15,313</i>	<i>15,340</i>	<i>15,313</i>	<i>15,591</i>	<i>15,812</i>	<i>15,902</i>	<i>16,079</i>
Blue economy (% of national jobs)	1.1%	1.0%	1.0%	1.0%	1.0%	0.9%	1.0%	1.0%	1.0%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	784	739	699	727	659	476	551	597	678
Marine living resources	482	489	480	471	476	607	603	531	528
Marine non-living resources	361	293	564	452	535	565	719	734	734
Port activities	563	600	612	617	669	644	635	651	651
Shipbuilding and repair	712	572	552	447	534	565	602	550	548
Maritime transport	172	161	230	208	232	198	156	175	175
Blue economy	3,074	2,853	3,137	2,922	3,104	3,056	3,266	3,238	3,314
<i>National GVA (EUR billion)</i>	<i>281.9</i>	<i>318.3</i>	<i>334.2</i>	<i>345.0</i>	<i>350.4</i>	<i>364.6</i>	<i>381.7</i>	<i>376.8</i>	<i>410.3</i>
Blue economy (% of GVA)	1.1%	0.9%	0.9%	0.8%	0.9%	0.8%	0.9%	0.9%	0.8%

Source: Eurostat, DCF and own calculations.

Poland: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation	33.2	19.5	842	779	369	325	16.4	25.0	5.6	7.7
	Transport	Transport	13.5	6.7	1,013	738	212	164	23.5	27.4	10.0	12.5
	Other expenditure	Other expenditure	24.1	17.7	1,063	1,011	203	189	14.8	18.1	4.2	5.9
	Capture fisheries	Small-scale coastal fleet	1.3	1.4	11	7	8	4	6.3	3.9	1.9	2.0
Extraction and commercialization of marine living resources	Aquaculture	Industrial fleet	1.4	1.0	31	41	16	25	12.0	25.9	5.6	7.2
		Finfish marine aquaculture										
	Aquaculture	Shellfish aquaculture										
		Freshwater aquaculture	0.1	8.9	77	102	1	1	19.1	21.3	8.1	0.1
	Processing and distribution	Processing and preserving of fish, crustaceans and molluscs	17.2	18.3	1,422	2,615	284	314	19.2	18.3	7.6	11.7
		Retail sale of fish, crustaceans and molluscs in specialised stores	2.0	1.8	210	106	23	14	27.1	17.7	2.2	3.0
		Wholesale of other food, including fish, crustaceans and molluscs	4.9	5.5	1,175	1,604	130	155	31.6	34.4	10.4	13.1
		Prepared meals and dishes	1.5	1.2	100	52	18	15	15.7	16.7	6.7	6.9
		Manufacture of oils and fats	0.0	0.0	5	3	1	0	65.6	58.8	12.3	16.6
		Other food products	0.1	0.0	6	0	2	0	35.3	31.6	11.5	14.0
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum										
		Extraction of natural gas	0.0	0.0	1	11	0	0	5.2	11.7	2.9	137.2
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	10.7	9.9	666	641	284	241	28.9	29.5	9.9	10.5
		Support activities for petroleum and natural gas extraction	1.1	1.1	81	65	41	35	32.3	32.4	20.3	24.6
		Support activities for other mining and quarrying	2.5	12.8	71	305	35	458	8.1	38.5	10.2	13.9
Maritime transport	Sea and coastal water transport	Sea and coastal passenger water transport	0.4	0.6	42	80	14	20	30.1	58.6	8.3	10.0
		Sea and coastal freight water transport	1.9	1.5	289	288	88	127	48.3	102.8	20.8	22.4
	Inland water transport	Inland freight water transport	0.7	0.9	106	83	32	21	90.5	53.9	8.6	7.5
		Inland passenger water transport	0.7	0.5	85	14	27	7	133.0	32.1	7.2	5.5
	Renting	Renting and leasing of water transport equipment	0.1	0.2	20	6	10	1	125.3	10.5	8.0	3.3
Ports, warehousing and construction of water projects	Cargo and warehousing	Cargo handling	7.8	5.7	418	366	161	170	29.4	36.6	10.7	13.0
		Warehousing and storage	8.3	15.2	385	1,595	117	318	13.2	23.5	8.4	12.2
	Water projects	Construction of water projects	9.5	6.4	894	427	206	98	22.4	18.1	11.2	11.6
		Service activities incidental to water transportation	2.4	1.9	209	205	79	65	54.7	43.4	15.9	15.2
	Service activities	Building of ships and floating structures	14.3	4.9	1,225	792	438	150	54.3	36.4	14.7	17.0
Shipbuilding and repair	Building of ships	Building of pleasure and sporting boats	4.0	5.7	164	351	57	115	14.5	21.8	7.6	12.6
		Repair and maintenance of ships and boats	9.7	10.7	396	726	179	257	30.0	34.0	9.5	13.8
	Repair	Manufacture of cordage, rope, twine and netting	0.0	0.0	2	3	1	1	20.9	23.9	7.2	9.6
		Manufacture of textiles other than apparel	0.0	1.7	1	79	0	22	13.0	16.1	5.5	7.7
	Equipment	Manufacture of engines and turbines, except aircraft	0.3	0.2	9	7	4	2	17.8	18.2	5.5	7.3
		Manufacture of sport goods	0.9	0.0	121	1	32	-	69.1	-	12.8	13.8
	Machinery	Manufacture of instruments for measuring, testing and navigation	0.0	0.1	2	7	1	2	24.1	29.3	10.1	15.3
Total Blue Economy			174.5	162.0	11,139	13,108	3,074	3,314	23.5	27.2	8.5	10.5

Source: Eurostat(SBS), DCF and own calculations.

PORTUGAL

The Portuguese Blue Economy employs around 180,900 people and generates almost €4.1 billion in GVA. It is dominated by coastal tourism, which contributed 74% to the total Blue Economy jobs and 66% to profits in 2017. The Living resources sector is also an important contributor, providing 20% of Blue Economy jobs and 19% of GVA in 2017.

Blue Economy GVA decreased over the period 2009-2012 and sharply increased hitting its highest level for the reporting period in 2017. The share of Blue Economy GVA to national GDP also saw a significant increase of 30% for that same period; while national GDP in Portugal increased by 11%. For employment, the Blue Economy again saw a rise in 2009-2017 whereas national employment fell. The share of Blue Economy employment to national employment also rose over the reporting period by 36%. In terms of overall national employment, the trend was negative. Average wage in Blue Economy sector-based jobs in 2016 was €12,700, a 3% decrease on 2009 figures.

Portugal: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	80.3	79.1	80.6	81.9	89.1	96.5	100.5	103.7	133.1
Marine living resources	41.2	39.7	40.9	38.5	38.5	37.5	36.8	37.0	36.3
Marine non-living resources	4.5	4.0	3.7	3.1	2.8	2.6	2.6	2.5	2.5
Port activities	4.5	4.5	4.4	4.2	4.2	4.3	4.3	4.2	4.2
Shipbuilding and repair	4.9	3.3	3.1	3.1	3.1	3.4	3.7	3.5	3.5
Maritime transport	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.3	1.3
Blue economy	136.7	132.0	134.1	132.2	138.9	145.7	149.1	152.1	180.9
<i>National employment</i>	<i>4,645</i>	<i>4,577</i>	<i>4,453</i>	<i>4,256</i>	<i>4,158</i>	<i>4,254</i>	<i>4,309</i>	<i>4,371</i>	<i>4,515</i>
Blue economy (% of national jobs)	2.9%	2.9%	3.0%	3.1%	3.3%	3.4%	3.5%	3.5%	4.0%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	1,531	1,474	1,474	1,396	1,678	1,861	1,921	2,130	2,703
Marine living resources	640	642	672	623	605	626	662	755	764
Marine non-living resources	163	144	130	99	98	90	98	79	79
Port activities	310	321	321	322	330	334	321	343	343
Shipbuilding and repair	121	91	78	81	93	101	126	124	123
Maritime transport	63	50	53	46	54	74	63	69	69
Blue economy	2,827	2,722	2,728	2,566	2,858	3,085	3,191	3,501	4,081
<i>National GVA (EUR billion)</i>	<i>155.5</i>	<i>158.3</i>	<i>154.2</i>	<i>147.4</i>	<i>149.8</i>	<i>151.4</i>	<i>156.8</i>	<i>162.2</i>	<i>168.7</i>
Blue economy (% of GVA)	1.8%	1.7%	1.8%	1.7%	1.9%	2.0%	2.0%	2.2%	2.4%

Source: Eurostat, DCF and own calculations.

Portugal: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Acomodation	Accommodation	46.3	66.6	1,951	3,234	937	1,577	21.9	30.4	14.5	12.3
	Transport	Transport	4.4	6.7	1,144	1,945	179	280	41.4	42.8	28.4	30.3
	Other expenditure	Other expenditure	29.6	59.8	1,555	3,176	414	846	18.5	18.3	8.9	9.4
	Capture fisheries	Small-scale coastal fleet	9.3	7.5	79	88	61	70	19.8	27.5	3.2	4.0
Extraction and commercialization of marine living resources	Aquaculture	Industrial fleet	8.5	7.4	289	318	165	209	26.5	37.0	12.3	15.3
		Finfish marine aquaculture	0.3	0.3	13	65	5	43	16.7	176.9	11.2	15.6
	Aquaculture	Shellfish aquaculture	2.0	2.4	23	43	21	40	22.9	71.7	1.8	2.2
		Freshwater aquaculture	0.0	0.0	1	2	0	0	7.1	12.5	6.5	12.8
	Processing and distribution	Processing and preserving of fish, crustaceans and molluscs	7.1	7.5	1,065	1,230	157	182	22.3	25.3	13.9	14.7
		Retail sale of fish, crustaceans and molluscs in specialised stores	5.9	4.6	302	281	44	40	20.0	18.2	3.2	4.6
		Wholesale of other food, including fish, crustaceans and molluscs	7.6	6.3	2,016	1,898	190	172	27.3	29.7	14.9	16.0
		Prepared meals and dishes	0.4	0.5	21	39	7	7	18.9	16.3	12.0	11.4
		Manufacture of oils and fats	0.0	0.0	7	2	0	0	48.4	48.4	18.3	18.3
		Other food products	0.0	0.0	1	2	0	0	36.2	39.2	18.7	19.0
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum										
		Extraction of natural gas										
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	4.1	2.1	366	212	136	67	34.4	33.3	16.9	17.6
		Support activities for petroleum and natural gas extraction										
Maritime transport	Sea and coastal water transport	Support activities for other mining and quarrying	0.4	0.4	48	42	28	12	76.0	33.8	23.3	29.2
		Sea and coastal passenger water transport	0.4	0.4	13	13	6	6	18.7	18.7	11.5	11.5
	Inland water transport	Sea and coastal freight water transport	0.6	0.5	300	325	50	56	82.5	127.6	42.5	36.5
		Inland freight water transport										
	Renting	Inland passenger water transport	0.2	0.2	12	12	5	5	23.1	23.1	19.0	19.0
		Renting and leasing of water transport equipment	0.1	0.1	5	7	1	2	20.6	27.7	7.9	7.0
Ports, warehousing and construction of water projects	Cargo and warehousing	Cargo handling	0.2	0.1	33	35	12	12	74.9	88.0	35.6	35.2
		Warehousing and storage	0.6	0.8	72	209	41	46	65.2	55.7	21.9	21.2
	Water projects	Construction of water projects	1.4	0.8	240	140	76	39	56.9	49.2	28.2	29.0
		Service activities incidental to water transportation	2.3	2.3	276	351	181	246	78.4	107.7	39.9	44.0
Shipbuilding and repair	Building of ships	Building of ships and floating structures	2.2	0.9	78	90	35	27	16.8	31.6	13.5	23.7
		Building of pleasure and sporting boats	0.4	0.6	22	69	4	22	10.4	36.8	15.6	27.2
	Repair	Repair and maintenance of ships and boats	1.7	1.6	203	177	68	56	42.1	37.7	22.0	25.3
		Manufacture of cordage, rope, twine and netting	0.2	0.3	18	38	5	9	22.6	30.0	14.9	17.3
	Equipment	Manufacture of textiles other than apparel	0.1	0.0	5	0	1	0	13.8	18.0	11.3	12.3
		Manufacture of sport goods	0.0	0.0	2	1	1	0	20.5	18.0	13.9	13.1
Machinery	Manufacture of engines and turbines, except aircraft	Manufacture of engines and turbines, except aircraft	0.1	0.1	60	28	6	9	46.1	110.7	18.2	19.6
		Manufacture of instruments for measuring, testing and navigation										
Total Blue Economy			136.7	180.9	10,220	14,071	2,827	4,081	25.4	29.1	13.1	12.7

Source: Eurostat (SBS), DCF and own calculations.

ROMANIA

The Romanian Blue Economy employs over 71,000 people and generates around €975 million in GVA. It is dominated by the Shipbuilding and repair sector, which contributed 35% of Blue Economy jobs and 33% of GVA. Ports, warehousing and water projects followed with 26% of overall Blue Economy GVA in 2016, while providing 17% of the jobs.

Romania's national GDP has seen a significant 50% increase in recent years, however the Blue Economy GVA has been more volatile and declining by 4%. In 2009-2017, the share of Blue Economy to national GDP fell by 34%. Employment has decreased at both national (5%) and Blue Economy level (24%). The share of Blue Economy to national overall jobs also fell by 20%.

Average wage in the Romanian Blue Economy in 2017 was €8,500, a 28% increase on 2009. Compared to 2009 average wage increased in all Blue Economy based sectors.

Romania: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	17.6	16.1	15.6	15.2	12.9	12.0	11.5	12.0	12.6
Marine living resources	7.0	8.0	6.3	6.6	6.1	6.4	6.9	7.8	8.2
Marine non-living resources	14.6	12.5	12.0	12.0	11.8	11.6	11.5	10.7	10.7
Port activities	19.9	19.4	20.2	18.3	14.7	14.0	13.7	12.4	12.4
Shipbuilding and repair	30.8	23.7	23.0	22.9	24.3	25.8	26.8	24.7	24.6
Maritime transport	3.4	3.4	3.0	2.7	2.7	2.5	2.5	2.5	2.5
Blue economy	93.3	83.1	80.2	77.7	72.5	72.2	72.8	69.9	70.9
<i>National employment</i>	<i>8,805</i>	<i>8,307</i>	<i>8,139</i>	<i>8,222</i>	<i>8,179</i>	<i>8,254</i>	<i>8,235</i>	<i>8,166</i>	<i>8,363</i>
Blue economy (% of national jobs)	1.1%	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.8%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	118	113	117	107	92	105	104	128	134
Marine living resources	71	54	42	46	64	80	91	114	114
Marine non-living resources	159	108	99	105	140	121	104	98	98
Port activities	315	332	319	268	239	195	300	256	256
Shipbuilding and repair	290	363	328	243	297	275	327	322	321
Maritime transport	63	57	55	52	52	58	47	51	51
Blue economy	1,015	1,026	959	822	884	835	974	968	975
<i>National GVA (EUR billion)</i>	<i>113.8</i>	<i>111.9</i>	<i>116.0</i>	<i>117.0</i>	<i>126.8</i>	<i>133.2</i>	<i>140.9</i>	<i>152.9</i>	<i>169.7</i>
Blue economy (% of GVA)	0.9%	0.9%	0.8%	0.7%	0.7%	0.6%	0.7%	0.6%	0.6%

Source: Eurostat, DCF and own calculations.

Romania: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Acomodation	Accommodation	7.4	5.8	147	141	61	62	8.6	11.3	4.1	5.8
	Transport	Transport	2.1	1.3	135	183	17	18	10.1	18.1	6.0	7.7
	Other expenditure	Other expenditure	8.2	5.5	253	240	40	54	5.3	10.6	3.4	5.2
	Capture fisheries	Small-scale coastal fleet	0.2	0.6	1	2	1	1	18.1	23.9	0.8	0.5
Extraction and commercialization of marine living resources	Aquaculture	Industrial fleet	0.0	0.2	0	3	0	2	28.6	36.9		2.5
		Finfish marine aquaculture										
	Shellfish aquaculture	Shellfish aquaculture										
		Freshwater aquaculture	2.7	3.7	52	90	25	63	9.8	21.8	2.8	3.3
		Processing and preserving of fish, crustaceans and molluscs	1.4	1.3	74	105	14	10	10.3	7.7	4.1	6.4
	Retail sale of fish, crustaceans and molluscs in specialised stores	0.8	0.9	23	42	3	4	4.7	4.4	2.1	3.5	
	Wholesale of other food, including fish, crustaceans and molluscs	1.9	1.5	328	275	28	34	15.5	23.5	5.1	9.8	
	Prepared meals and dishes	0.0	0.0	0	0	0	0	2.6	4.4	1.8	2.5	
	Manufacture of oils and fats											
	Other food products											
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum	5.9	2.9	606	568						
		Extraction of natural gas	1.2	1.3	156	163						
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	5.8	5.3	212	258	68	74	12.2	14.5	4.1	6.3
		Support activities for petroleum and natural gas extraction	1.5	1.0	107	85	87	22	54.1	21.8	18.1	19.3
		Support activities for other mining and quarrying	0.2	0.2	25	6	3	2	19.3	11.4	4.6	7.9
Maritime transport	Sea and coastal water transport		0.0	0.0		1	0	0	13.8	8.6		3.2
	Inland water transport		0.8	0.3	64	59	17	12	21.4	48.8	8.4	16.7
	Renting		2.1	1.7	120	92	42	32	20.9	19.1	8.2	9.4
			0.4	0.3	6	8	3	7	11.6	21.8	4.0	8.4
			0.1	0.1	3	4						
Ports, warehousing and construction of water projects	Cargo and warehousing		1.6	1.6	47	62	25	33	15.7	19.9	8.5	11.4
	Water projects		0.5	0.5	23	37	8	10	16.3	19.2	6.2	8.7
	Service activities		12.2	5.3	525	215	163	48	13.6	9.3	7.5	8.0
			5.6	5.0	272	320	119	165	21.6	33.6	10.1	13.0
Shipbuilding and repair	Building of ships		22.0	15.8	1,005	871	217	230	9.9	14.7	8.6	11.4
	Repair		0.3	0.2	7	11	2	3	6.3	12.1	3.0	5.2
	Equipment		7.9	8.3	132	163	63	83	8.0	10.1	5.4	7.5
			0.0	0.0	1	0	0	0	7.2	13.4	4.8	7.4
			0.0	0.0	0	1	0	0	5.1	8.8	3.7	6.5
Machinery			0.0	0.0	0	0	0	0	8.2	10.5	5.4	7.1
			0.6	0.3	26	28	7	6	12.5	12.5	8.3	13.8
			0.0	0.0	1	0	0	0	17.9	19.2	10.3	7.8
Total Blue Economy			93.3	70.9	4,349	4,033	1,015	975	12.1	15.3	6.7	8.5

Source: Eurostat (SBS), DCF and own calculations.

SLOVENIA

Although a coastal state, Slovenia has a coastline only 47 km long. The Slovenian Blue Economy employs 6,000 people and generates around €262 million in GVA. The Blue Economy is dominated by the ports, warehousing and water projects sector, which contributed 37% to Blue Economy jobs and 52% to GVA, followed by the coastal tourism sector, generating 20% of the jobs and 12% of the GVA.

The Slovenian Blue Economy represents 0.61% share of the national economy and 0.64% of employment. The Blue Economy increased by 5% in terms of GVA and decreased 6% in terms of jobs compared to 2009. While the national GDP remained stable for several, growing slightly towards the end of the reporting period, 19% compared to 2009, overall the Blue Economy GVA increased 25%.

In terms of employment, national jobs decreased 1% while Blue Economy jobs decreased 8% compared to 2009. Average wage in the Slovenian Blue Economy sectors in 2016 was €2,400, an 11% increase on 2009.

Slovenia: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	1.2	1.2	1.1	1.1	1.2	1.3	1.1	1.2	1.2
Marine living resources	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8
Marine non-living resources	0.7	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6
Port activities	2.7	2.5	2.5	2.3	2.1	2.0	2.2	2.2	2.2
Shipbuilding and repair	0.8	0.9	0.8	0.7	0.7	0.7	0.8	0.9	0.9
Maritime transport	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Blue economy	6.5	6.3	6.1	5.9	5.6	5.7	5.8	6.0	6.0
<i>National employment</i>	<i>955</i>	<i>942</i>	<i>915</i>	<i>906</i>	<i>888</i>	<i>892</i>	<i>902</i>	<i>902</i>	<i>943</i>
Blue economy (% of national jobs)	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	0.6%	0.7%	0.6%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	28	28	28	28	26	29	26	31	32
Marine living resources	19	18	23	18	19	17	19	20	19
Marine non-living resources	26	25	24	21	21	27	25	22	22
Port activities	109	129	138	130	117	117	126	135	135
Shipbuilding and repair	14	31	25	23	25	25	32	38	39
Maritime transport	12	15	12	24	12	13	15	15	15
Blue economy	209	246	249	245	219	228	242	261	262
<i>National GVA (EUR billion)</i>	<i>31.6</i>	<i>31.6</i>	<i>32.1</i>	<i>31.3</i>	<i>31.3</i>	<i>32.5</i>	<i>33.6</i>	<i>34.9</i>	<i>37.4</i>
Blue economy (% of GVA)	0.7%	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%

Source: Eurostat, DCF and own calculations.

Slovenia: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Acomodation	Accommodation	0.8	0.8	41	45	19	21			17.7	16.4
	Transport	Transport	0.1	0.0	44	43	3	3			29.4	26.9
	Other expenditure	Other expenditure	0.4	0.4	28	29	6	7			11.9	13.2
	Capture fisheries	Small-scale coastal fleet	0.1	0.1	1	2	0	1	8.9	22.3	4.7	4.5
Extraction and commercialization of marine living resources		Industrial fleet	0.1	0.0	2	1	1	0	34.8	33.1	11.3	4.7
		Finfish marine aquaculture	0.0	0.0	1	1	1	0	53.8	27.8	21.2	4.4
	Aquaculture	Shellfish aquaculture	0.0	0.0	1	1	1	1	78.5	54.7	15.0	13.6
		Freshwater aquaculture	0.0	0.0	3	5	1	1	45.8	44.4	16.0	13.3
	Processing and distribution	Processing and preserving of fish, crustaceans and molluscs	0.3	0.3	15	12	4	2			9.5	6.4
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.1	0.1	9	8	2	2			13.3	14.5
		Wholesale of other food, including fish, crustaceans and molluscs	0.2	0.3	52	117	9	11			19.8	25.2
		Prepared meals and dishes	0.0	0.0	1	1	0	0			13.6	17.4
		Manufacture of oils and fats										
		Other food products	0.0	0.0	0	0	0	0			19.7	19.5
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum										
		Extraction of natural gas										
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	0.7	0.6	67	62	26	22			19.3	21.0
		Support activities for petroleum and natural gas extraction										
Maritime transport	Sea and coastal water transport	Support activities for other mining and quarrying	0.0	0.0								
		Sea and coastal passenger water transport	0.0	0.0	2	1	1	1			10.9	7.5
	Inland water transport	Sea and coastal freight water transport	0.2	0.1	50	40	10	10			37.4	43.0
		Inland freight water transport			1	1	0	0				
Ports, warehousing and construction of water projects	Renting	Inland passenger water transport	0.0	0.0	1	2	1	2			5.3	5.3
		Renting and leasing of water transport equipment	0.0	0.0	5	4	0	2			11.4	12.5
	Cargo and warehousing	Cargo handling	1.1	1.3	120	177	66	101			27.1	31.9
		Warehousing and storage	0.1	0.1	9	10	2	2			18.0	16.5
	Water projects	Construction of water projects	1.1	0.5	88	69	32	17			21.8	22.7
		Service activities incidental to water transportation	0.3	0.3	22	39	9	15			24.7	34.0
Shipbuilding and repair	Building of ships	Building of ships and floating structures	0.0	0.0	2	1	1	0			12.8	20.8
		Building of pleasure and sporting boats	0.5	0.2	47	20	5	7			21.2	17.8
	Repair	Repair and maintenance of ships and boats	0.1	0.2	5	14	2	5			7.1	10.5
		Manufacture of cordage, rope, twine and netting	0.0	0.0	1	0	0	0			16.4	10.4
	Equipment	Manufacture of textiles other than apparel	0.0	0.1	1	6	0	2			14.9	18.9
		Manufacture of sport goods	0.0	0.0	0	0	0	0			17.9	17.2
Machinery	Manufacture of engines and turbines, except aircraft	0.1	0.4	15	48	6	24			22.2	32.6	
	Manufacture of instruments for measuring, testing and navigation	0.0	0.0	1	0	0	0			27.2	29.0	
Total Blue Economy			6.5	6.0	635	757	209	262	34.7	32.5	20.2	22.4

Source: Eurostat (SBS), DCF and own calculations.

SLOVAKIA

As a landlocked country, the Blue Economy is not a main contributor to the Slovakian economy as a whole. Slovakia's national GDP grew steadily throughout the reporting period, overall increasing 33% compared to 2009. However, the Blue Economy GVA, observed significant growth for the reporting period. Overall, Blue Economy GVA growth outpaced the national economy, more than doubled compared to 2009. The share of Blue Economy GVA to national GDP oscillated over the period, increasing from its lowest point in 2009 (0.06%) to 0.12% in 2017. On employment, Blue Economy-based job growth outpaced the national employment growth. As for the Blue Economy share of national employment, it increased 30% between 2009 and 2017.

Slovakia: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism									
Marine living resources	1.2	1.3	1.2	1.1	1.0	1.0	1.0	1.1	1.2
Marine non-living resources	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2
Port activities	1.5	1.9	1.8	1.8	2.9	3.0	3.2	3.8	3.8
Shipbuilding and repair	0.8	1.0	1.1	0.6	0.6	0.6	0.5	0.5	0.6
Maritime transport	0.6	0.6	0.7	0.5	0.5	0.4	0.5	0.4	0.4
Blue economy	4.5	5.0	5.0	4.2	5.3	5.3	5.4	6.0	6.1
National employment	2,357	2,307	2,303	2,317	2,318	2,349	2,405	2,472	2,502
Blue economy (% of national jobs)	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism									
Marine living resources	23	22	15	21	14	13	10	-	0
Marine non-living resources	10	10	10	10	10	10	12	8	8
Port activities	-	12	8	4	2	31	71	59	70
Shipbuilding and repair	6	9	9	6	7	8	7	7	7
Maritime transport	13	13	12	15	10	13	14	14	14
Blue economy	40	61	51	55	72	115	101	98	99
National GVA (EUR billion)	58.0	61.4	64.0	66.4	67.5	68.9	71.4	73.4	76.4
Blue economy (% of GVA)	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%

Source: Eurostat, DCF and own calculations.

Slovakia: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Accommodation	Accommodation										
	Transport	Transport										
	Other expenditure	Other expenditure										
	Capture fisheries	Small-scale coastal fleet										
Extraction and commercialization of marine living resources	Aquaculture	Industrial fleet										
		Finfish marine aquaculture										
		Shellfish aquaculture										
		Freshwater aquaculture	0.0	0.1	2	5	0	2	45.3	44.4	16.0	13.2
	Processing and distribution	Processing and preserving of fish, crustaceans and molluscs	0.7	0.6	58	72	11	2	16.5	2.6	10.9	12.5
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.0	0.0	0	1	0	0	8.3	14.3	5.9	5.9
		Wholesale of other food, including fish, crustaceans and molluscs	0.5	0.3	93	286	12	5	39.2	17.0	14.2	18.0
		Prepared meals and dishes	0.0	0.2	0	10	0	2	5.9	9.5	8.3	9.1
		Manufacture of oils and fats										
		Other food products										
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum										
		Extraction of natural gas										
		Operation of gravel and sand pits; mining of clays and kaolin										
	Support activities	Support activities for petroleum and natural gas extraction										
		Support activities for other mining and quarrying	0.3	0.2	17	14	10	8	38.5	38.0	30.6	32.3
		Sea and coastal passenger water transport		0.0		0						
		Sea and coastal freight water transport										
Maritime transport	Inland water transport	Inland freight water transport	0.6	0.3	52	73	10	12	17.7	45.7	13.1	27.1
	Renting	Inland passenger water transport	0.0	0.1	4	7	2	2	57.1	25.8	16.3	8.0
		Renting and leasing of water transport equipment	0.0	0.0	2	0	1			11.1		
	Cargo and warehousing	Cargo handling	0.2	0.4	7	22	4	11	17.5	43.1	9.3	11.5
Ports, warehousing and construction of water projects	Water projects	Warehousing and storage	1.0	3.1	73	397	24	53	26.1	18.2	14.5	18.3
		Construction of water projects	0.3	0.1	23	3	7	1	60.7	22.0	12.7	10.7
	Service activities	Service activities incidental to water transportation	0.0	0.2	4	8	2	4	76.4	16.0	5.4	5.4
		Building of ships and floating structures	0.5	0.0	25	2	2	1	3.7	18.2	10.9	7.3
Shipbuilding and repair	Building of ships	Building of pleasure and sporting boats	0.0	0.1	1	3	0	0	21.4	3.1	9.5	9.2
		Repair and maintenance of ships and boats	0.1	0.1	4	7	1	1	21.6	24.5	9.2	12.3
	Repair	Manufacture of cordage, rope, twine and netting	0.1	0.0	3	3	1	1	15.3	21.2	11.0	15.2
		Manufacture of textiles other than apparel	0.2	0.3	6	13	2	5	12.6	15.7	7.0	8.4
	Equipment	Manufacture of sport goods	0.0	0.0	0	1	0	0	9.6	23.7	8.6	15.3
		Manufacture of engines and turbines, except aircraft	0.0	0.0	0	0	0	0	8.8	16.1	11.7	14.3
	Machinery	Manufacture of instruments for measuring, testing and navigation	0.0	0.0	0	0	0	0	32.2	38.9	12.6	17.4
Total Blue Economy			4.5	6.1	374	926	40	99	10.5	18.2	13.4	16.2

Source: Eurostat (SBS), DCF and own calculations.

FINLAND

The Finnish Blue Economy employs over 53,600 people and generates almost €3.1 billion in GVA. It is dominated by the coastal tourism sector, which contributed 41% of the jobs and 32% to overall profits in 2017. Most investment is also concentrated in coastal tourism.

Much like Estonia, Finland has seen a fall in how much the Blue Economy contributes to its national GDP: from around 1.6% in 2009, by 2017 this figure dropped to 1.4%. Finland's national GDP increased during this period, Blue Economy GVA has increased at a lower rate. Instead, the Blue Economy's employment share and number of jobs have also decreased, with national employment following the same pattern, but at a lower rate. The average wage in Blue Economy-based jobs in 2017 was €38,500, an 8% increase on 2009.

Finland: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	24.1	23.7	23.1	22.3	21.6	19.7	20.3	20.0	22.2
Marine living resources	4.8	5.0	5.0	4.7	5.0	5.2	5.0	5.1	4.9
Marine non-living resources	1.7	1.7	1.8	1.7	1.7	1.6	1.6	2.1	2.1
Port activities	8.4	8.4	8.4	8.4	8.5	10.2	7.6	7.6	7.6
Shipbuilding and repair	11.1	10.2	9.9	9.8	8.3	8.5	8.1	7.9	7.8
Maritime transport	9.7	9.4	9.5	9.3	9.4	9.5	9.0	8.9	8.9
Blue economy	59.8	58.4	57.7	56.3	54.5	54.6	51.6	51.7	53.6
<i>National employment</i>	<i>2,423</i>	<i>2,410</i>	<i>2,428</i>	<i>2,431</i>	<i>2,403</i>	<i>2,386</i>	<i>2,368</i>	<i>2,380</i>	<i>2,403</i>
Blue economy (% of national jobs)	2.5%	2.4%	2.4%	2.3%	2.3%	2.3%	2.2%	2.2%	2.2%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	847	882	898	856	802	724	832	883	984
Marine living resources	202	215	218	204	209	210	186	219	218
Marine non-living resources	125	116	108	94	88	80	97	151	151
Port activities	537	582	579	580	588	672	546	569	569
Shipbuilding and repair	539	456	539	504	353	408	415	452	438
Maritime transport	577	642	607	590	640	690	752	710	710
Blue economy	2,827	2,893	2,948	2,828	2,680	2,784	2,828	2,984	3,071
<i>National GVA (EUR billion)</i>	<i>158.3</i>	<i>163.6</i>	<i>170.5</i>	<i>172.4</i>	<i>175.0</i>	<i>177.0</i>	<i>181.2</i>	<i>185.9</i>	<i>193.3</i>
Blue economy (% of GVA)	1.8%	1.8%	1.7%	1.6%	1.5%	1.6%	1.6%	1.6%	1.6%

Source: Eurostat, DCF and own calculations.

Finland: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Acommodation	Accommodation	5.9	5.7	613	706	189	248	41.2	56.9	26.3	28.7
	Transport	Transport	7.0	5.0	1,427	1,407	311	350	50.0	79.2	43.4	50.5
	Other expenditure	Other expenditure	11.2	11.5	1,239	1,369	348	387	42.2	46.4	23.1	25.7
	Capture fisheries	Small-scale coastal fleet	1.3	1.3	13	8	8	4	59.3	28.5	0.5	0.4
Extraction and commercialization of marine living resources		Industrial fleet	0.1	0.1	18	26	6	13	67.0	113.6	19.1	27.6
		Finfish marine aquaculture	0.1	0.1	17	21	4	5	55.8	68.8	26.5	23.1
	Aquaculture	Shellfish aquaculture										
		Freshwater aquaculture	0.4	0.5	40	74	15	20	46.9	57.8	25.8	26.1
		Processing and preserving of fish, crustaceans and molluscs	0.9	1.0	196	310	36	44	50.8	61.2	28.9	30.3
		Retail sale of fish, crustaceans and molluscs in specialised stores	0.7	0.7	108	156	23	27	45.7	48.2	24.0	28.3
	Processing and distribution	Wholesale of other food, including fish, crustaceans and molluscs	1.2	1.1	611	667	104	93	104.5	110.6	43.3	45.9
		Prepared meals and dishes	0.1	0.2	21	40	6	12	58.6	64.7	35.5	40.4
		Manufacture of oils and fats										
		Other food products	0.0	0.0	1	1	0	0	56.0	56.5	31.0	38.7
Marine extraction of minerals, oil and gas		Extraction of crude petroleum										
	Extraction	Extraction of natural gas										
		Operation of gravel and sand pits; mining of clays and kaolin	1.6	1.2	400	278	113	88	87.5	93.5	38.3	38.1
	Support activities	Support activities for petroleum and natural gas extraction										
Maritime transport		Support activities for other mining and quarrying	0.2	0.9	22	133	11	63	76.5	70.9	42.0	48.4
	Sea and coastal water transport	Sea and coastal passenger water transport	5.6	5.8	1,019	1,143	275	321	61.3	66.9	42.9	44.5
	Inland water transport	Sea and coastal freight water transport	3.8	2.9	1,379	1,262	292	379	93.3	156.8	50.5	57.5
		Inland freight water transport	0.0	0.0	4	6	2	3	53.1	81.8	47.4	44.7
		Inland passenger water transport	0.2	0.2	12	10	6	5	42.4	38.5	19.7	20.4
		Renting and leasing of water transport equipment	0.0	0.0	2	5	1	2	93.3	366.7	28.6	13.3
Ports, warehousing and construction of water projects	Cargo and warehousing	Cargo handling	1.6	1.4	164	201	80	92	55.9	74.9	46.9	52.5
	Water projects	Warehousing and storage	4.5	4.0	596	557	210	197	53.3	65.5	36.3	36.8
		Construction of water projects	0.6	0.5	106	89	38	30	82.4	75.6	41.1	42.3
	Service activities	Service activities incidental to water transportation	1.8	1.7	308	397	209	251	128.3	159.4	53.4	60.9
Shipbuilding and repair	Building of ships	Building of ships and floating structures	5.5	3.6	1,192	1,236	220	211	41.9	63.9	41.0	51.5
	Repair	Building of pleasure and sporting boats	2.4	1.9	224	302	63	95	33.9	58.9	29.9	40.9
		Repair and maintenance of ships and boats	0.8	0.9	84	150	33	44	59.4	77.2	29.6	32.6
		Manufacture of cordage, rope, twine and netting	0.0	0.0	2	2	1	1	53.2	62.4	31.7	42.4
	Equipment	Manufacture of textiles other than apparel	0.5	0.4	46	50	16	18	47.2	56.6	25.7	30.8
		Manufacture of sport goods	0.3	0.2	40	29	12	9	53.9	56.8	33.0	37.8
Machinery		Manufacture of engines and turbines, except aircraft	1.6	0.6	947	295	194	49	137.0	94.3	62.5	61.1
		Manufacture of instruments for measuring, testing and navigation	0.0	0.2	2	28	1	12	84.6	87.9	48.8	57.7
Total Blue Economy			59.8	53.6	10,849	10,958	2,827	3,071	58.5	72.9	35.7	38.5

Source: Eurostat(SBS), DCF and own calculations.

SWEDEN

The Swedish Blue Economy employs over 152,000 people and generates almost €7.6 billion in GVA. It is dominated by the coastal tourism sector, which contributed 78% of Blue Economy jobs and 71% of GVA in 2017. It should be noted that Eurostat has changed the methodology to estimate coastal tourism data, and this is reflected in the unreal increase coastal tourism figures have in 2017.

Both Blue Economy GVA and national GDP have substantially increased in Sweden over the reporting period. The share of Blue Economy GVA to national GDP was slightly lower in 2016 than in 2009, while much higher in 2017. Employment in Sweden shows a very similar trend for the Blue Economy.

Average wage in the Swedish Blue Economy in 2017 was €36,900, a 23% rise on 2009 figures. Compared to 2009 wages, the fact that average wage increased in all Blue Economy sectors.

Sweden: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	44.9	40.6	38.9	37.2	35.8	38.7	41.2	46.1	46.1
Marine living resources	7.8	8.1	8.0	8.1	8.0	8.3	8.0	8.4	8.3
Marine non-living resources	2.8	2.7	2.6	2.7	2.6	2.5	2.0	2.0	2.0
Port activities	4.0	4.1	4.0	3.8	3.7	3.7	3.7	3.9	3.9
Shipbuilding and repair	6.6	6.2	6.1	6.5	6.2	6.0	6.0	6.1	6.2
Maritime transport	17.6	16.8	16.3	15.9	14.9	14.0	13.7	13.6	13.6
Blue economy	83.6	78.5	75.9	74.2	71.2	73.2	74.8	80.0	80.0
<i>National employment</i>	<i>4,391</i>	<i>4,403</i>	<i>4,498</i>	<i>4,510</i>	<i>4,554</i>	<i>4,597</i>	<i>4,660</i>	<i>4,736</i>	<i>4,834</i>
Blue economy (% of national jobs)	1.9%	1.8%	1.7%	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	1,438	1,453	1,487	1,577	1,487	1,578	1,760	1,946	1,946
Marine living resources	304	369	365	399	407	434	403	442	448
Marine non-living resources	150	165	220	235	215	219	198	205	205
Port activities	241	296	307	303	300	337	333	353	353
Shipbuilding and repair	266	333	347	405	403	375	413	390	393
Maritime transport	622	819	739	794	717	745	943	806	806
Blue economy	3,022	3,434	3,464	3,713	3,529	3,687	4,049	4,142	4,151
<i>National GVA (EUR billion)</i>	<i>272.3</i>	<i>324.9</i>	<i>357.4</i>	<i>374.3</i>	<i>385.8</i>	<i>383.7</i>	<i>397.9</i>	<i>409.4</i>	<i>420.3</i>
Blue economy (% of GVA)	1.1%	1.1%	1.0%	1.0%	0.9%	1.0%	1.0%	1.0%	1.0%

Source: Eurostat, DCF and own calculations.

Sweden: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand		Turnover EUR million		GVA EUR million		GVA per FTE EUR thousand		Empl. Compensation EUR thousand	
			2009	2017	2009	2017	2009	2017	2009	2017	2009	2017
Coastal tourism	Acomodation	Accommodation	19.4	22.3	1,455	2,114	602	921	44.6	61.5	24.5	31.1
	Transport	Transport	9.9	6.6	1,962	1,564	406	396	54.4	77.3	35.1	44.3
	Other expenditure	Other expenditure	15.5	17.2	1,535	1,969	430	629	40.5	52.9	21.6	28.2
	Capture fisheries	Small-scale coastal fleet	0.9	0.8	17	16	8	8	21.7	27.6	0.6	1.6
Extraction and commercialization of marine living resources	Aquaculture	Industrial fleet	0.8	0.6	103	122	43	73	68.2	157.5	12.7	30.9
		Finfish marine aquaculture										
		Shellfish aquaculture	0.1	0.1	1	2	1	2	23.8	87.1	6.8	4.4
	Processing and distribution	Freshwater aquaculture	0.3	0.6	30	60	8	31	40.8	117.4	13.6	14.2
		Processing and preserving of fish, crustaceans and molluscs	2.0	2.0	467	565	99	92	57.0	55.9	32.5	36.4
		Retail sale of fish, crustaceans and molluscs in specialised stores	1.2	1.5	139	190	32	52	42.6	55.4	18.0	26.5
		Wholesale of other food, including fish, crustaceans and molluscs	2.3	2.5	884	1,260	108	171	62.0	89.3	30.4	41.7
	Support activities	Prepared meals and dishes	0.1	0.2	15	59	5	19	54.7	92.1	31.1	47.5
		Manufacture of oils and fats										
		Other food products	0.0	0.0	0	0	0	0	49.2	76.9	32.1	48.7
Marine extraction of minerals, oil and gas	Extraction	Extraction of crude petroleum										
		Extraction of natural gas										
	Support activities	Operation of gravel and sand pits; mining of clays and kaolin	2.6	1.9	496	674	161	209	71.9	138.1	37.2	49.9
		Support activities for petroleum and natural gas extraction										
Maritime transport	Support activities	Support activities for other mining and quarrying	0.1	0.1	15	6	10	3	107.3	72.3	64.6	71.3
		Sea and coastal passenger water transport	9.7	8.4	1,186	1,789	316	383	42.4	61.0	28.8	45.9
		Sea and coastal freight water transport	6.7	3.6	2,332	1,617	216	309	39.2	101.9	47.3	63.2
		Inland freight water transport	0.2	0.1	12	19	4	7	38.1	84.7	22.4	34.2
Ports, warehousing and construction of water projects	Inland water transport	Inland passenger water transport	1.0	1.4	80	193	16	70	24.7	84.1	26.7	35.2
		Renting and leasing of water transport equipment	0.1	0.1	81	50	70	36	2,005.7	683.0	26.7	32.3
	Cargo and warehousing	Cargo handling	0.8	0.8	81	116	49	62	72.3	96.3	42.7	53.1
		Warehousing and storage	0.2	0.3	33	51	12	21	70.2	93.8	33.9	44.0
Shipbuilding and repair	Water projects	Construction of water projects	0.5	0.5	82	110	24	36	51.6	84.1	34.7	47.0
		Service activities incidental to water transportation	2.4	2.2	314	404	156	234	84.7	142.3	50.8	77.2
	Building of ships	Building of ships and floating structures	1.6	1.5	221	316	56	108	37.5	85.2	51.8	61.1
		Building of pleasure and sporting boats	2.1	1.3	262	207	70	54	40.3	53.1	32.0	41.2
Machinery	Repair	Repair and maintenance of ships and boats	1.9	1.9	289	315	83	103	55.7	69.9	32.7	38.8
		Manufacture of cordage, rope, twine and netting	0.0	0.0	0	0	0	0	91.3	94.5	51.3	54.4
	Equipment	Manufacture of textiles other than apparel	0.0	0.7	3	95	1	33	40.7	62.6	28.0	37.5
		Manufacture of sport goods	0.0	0.0	7	8	2	2	58.0	65.6	35.1	39.9
Machinery	Machinery	Manufacture of engines and turbines, except aircraft	0.7	0.7	208	299	47	82	77.2	135.0	49.9	76.2
		Manufacture of instruments for measuring, testing and navigation	0.1	0.1	19	27	7	12	78.8	120.1	53.5	66.5
Total Blue Economy			83.6	80.0	12,329	14,214	3,022	4,151	48.9	69.0	30.1	36.9

Source: Eurostat(SBS), DCF and own calculations.

UNITED KINGDOM

The UK Blue Economy employs over 516,200 people and generates around €36.1 billion in GVA. It is dominated by the offshore oil sector, which contributed 33% to overall GVA and 31% to jobs in 2017. Coastal tourism is also an important contributor, with 34% of jobs and 22% of GVA.

Average wage in the UK Blue Economy in 2017 was €34,600, a 6% increase on 2009.

Overall, Blue Economy GVA increased 11% compared to 2009, increasing in all sectors but marine extraction of minerals, oil and gas with a 30% decrease. On employment, the Blue Economy share, at 1.68% in 2017, has been relatively stable over the whole period. Overall Blue Economy jobs in 2017 increased 9% compared to 2009.

United Kingdom: Evolution of the established Blue Economy sectors

Persons employed (thousand)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	247.0	243.4	243.7	219.6	233.5	195.9	175.0	191.8	201.3
Marine living resources	46.5	46.4	46.1	45.9	46.2	47.2	46.7	46.6	46.2
Marine non-living resources	40.0	44.4	44.5	48.1	44.4	44.5	44.7	43.5	43.5
Port activities	76.3	80.7	74.8	97.9	101.4	101.0	109.8	158.5	158.5
Shipbuilding and repair	45.4	41.0	38.0	42.0	40.4	44.5	42.9	50.0	50.5
Maritime transport	17.2	17.1	16.7	17.7	16.6	17.7	19.2	16.1	16.1
Blue economy	472.4	473.1	463.8	471.4	482.5	450.7	438.3	506.4	516.2
<i>National employment</i>	<i>28,319</i>	<i>28,290</i>	<i>28,404</i>	<i>28,650</i>	<i>28,917</i>	<i>29,559</i>	<i>30,016</i>	<i>30,424</i>	<i>30,783</i>
Blue economy (% of national jobs)	1.7%	1.7%	1.6%	1.6%	1.7%	1.5%	1.5%	1.7%	1.7%

GVA (EUR million)	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coastal tourism	7,105	7,098	7,108	7,073	7,577	7,622	7,529	7,784	8,114
Marine living resources	2,057	1,858	1,930	2,060	2,064	2,538	2,658	2,847	2,778
Marine non-living resources	17,013	17,803	17,273	18,177	18,257	17,691	16,391	11,860	11,860
Port activities	5,262	5,127	5,050	5,405	5,665	6,208	8,246	7,466	7,466
Shipbuilding and repair	1,788	2,272	2,104	2,914	2,415	3,112	3,272	2,897	2,908
Maritime transport	2,601	2,791	2,355	2,621	2,539	3,202	3,961	2,984	2,984
Blue economy	35,825	36,949	35,820	38,249	38,516	40,373	42,057	35,838	36,111
<i>National GVA (EUR billion)</i>	<i>1,571.4</i>	<i>1,666.5</i>	<i>1,691.9</i>	<i>1,868.3</i>	<i>1,852.5</i>	<i>2,041.8</i>	<i>2,331.1</i>	<i>2,142.9</i>	<i>2,082.7</i>
Blue economy (% of GVA)	2.3%	2.2%	2.1%	2.0%	2.1%	2.0%	1.8%	1.7%	1.7%

Source: Eurostat, DCF and own calculations.

United Kingdom: Overview of the established Blue Economy sectors by activity

Sector	Sub-sector	Activity	Persons employed thousand			Turnover EUR million			GVA EUR million			GVA per FTE EUR thousand			Empl. Compensation EUR thousand		
			2009	2017		2009	2017		2009	2017		2009	2017		2009	2017	
Coastal tourism	Accommodation		119.0	101.2		6,303	6,407		3,239	3,582		35.7	46.3		14.6	17.8	
	Transport		38.1	25.5		7,103	6,397		2,161	2,491		62.1	108.0		39.6	46.9	
	Other expenditure		89.9	74.7		5,406	5,799		1,705	2,041		28.9	40.1		12.3	15.3	
Extraction and commercialization of marine living resources	Capture fisheries	Small-scale coastal fleet	5.6	5.5		113	139		64	80		31.6	45.7		5.6	6.6	
		Industrial fleet	6.6	6.3		796	993		378	530		50.3	79.8		29.8	38.0	
		Finfish marine aquaculture	1.1	1.9		467	944		90	255		92.4	145.3		47.0	44.6	
		Shellfish aquaculture	0.8	0.7		47	29		34	16		55.2	32.9		12.2	11.1	
		Freshwater aquaculture	1.0	0.7		45	60		2	15		2.6	27.1		9.9	13.8	
		Processing and preserving of fish, crustaceans and molluscs	15.8	14.2		3,101	3,401		680	804		45.4	60.6		21.1	28.9	
		Retail sale of fish, crustaceans and molluscs in specialised stores	3.2	3.2		288	360		69	87		39.1	42.3		2.3	14.2	
		Wholesale of other food, including fish, crustaceans and molluscs	8.0	9.0		3,040	3,593		607	666		92.1	81.7		29.8	32.6	
		Prepared meals and dishes	3.7	4.6		878	840		89	313		25.5	71.0		53.2	41.0	
		Manufacture of oils and fats	0.0	0.0		19	14		6	3		405.3	149.6		53.5	67.4	
Marine extraction of minerals, oil and gas		Other food products	0.7	0.1		145	23		37	8		55.6	75.5		29.4	33.6	
		Extraction of crude petroleum	14.5	16.4		32,727	20,656		13,845	9,468		979.1	592.5		233.7	153.7	
		Extraction of natural gas	0.4	0.1		168	135		125	97		355.1	734.1		60.1	93.0	
		Operation of gravel and sand pits; mining of clays and kaolin	9.7	6.6		2,179	1,577		449	568		48.3	89.9		38.0	49.1	
		Support activities for petroleum and natural gas extraction	15.3	20.2		6,299	5,779		2,592	1,687		173.4	85.2		68.7	89.9	
		Support activities for other mining and quarrying	0.1	0.2		3	180		2	40		16.8	297.7		1.5	164.9	
		Sea and coastal passenger water transport	9.0	6.3		3,352	3,130		995	1,301		122.5	232.2		56.8	80.0	
		Sea and coastal freight water transport	5.5	6.9		5,413	4,612		1,463	1,420		310.0	224.3		120.4	110.8	
		Inland freight water transport	0.3	0.3		62	44		16	19		58.7	90.4		13.0	31.2	
		Inland passenger water transport	1.3	1.8		60	185		23	88		26.1	63.0		17.8	25.2	
Maritime transport		Renting and leasing of water transport equipment	1.1	0.8		216	373		104	156		121.4	240.5		8.3	35.7	
		Cargo handling	1.1	1.7		248	317		95	137		88.6	87.9		41.0	42.9	
		Warehousing and storage	53.8	132.5		6,168	14,575		2,394	4,414		49.2	38.9		28.7	24.1	
		Construction of water projects	1.9	1.9		657	481		343	175		217.4	98.6		29.9	32.7	
		Service activities incidental to water transportation	19.5	22.4		3,575	4,048		2,429	2,740		132.3	132.6		45.0	51.8	
		Building of ships and floating structures	28.9	21.5		3,106	3,393		1,020	1,689		36.0	79.6		30.9	45.1	
		Building of pleasure and sporting boats	9.9	10.5		1,052	916		384	300		41.3	29.5		34.3	28.2	
		Repair and maintenance of ships and boats	3.9	13.3		372	2,475		170	629		49.3	50.0		26.3	31.2	
		Manufacture of cordage, rope, twine and netting	0.0	0.0		1	1		0	0		39.8	27.7		18.0	22.4	
		Manufacture of textiles other than apparel	0.6	3.6		49	379		22	154		43.9	49.0		17.2	23.4	
Shipbuilding and repair		Manufacture of sport goods	0.3	0.3		34	46		9	18		34.1	66.2		26.1	27.7	
		Manufacture of engines and turbines, except aircraft	0.3	0.7		288	259		91	66		272.1	102.8		157.3	62.3	
		Manufacture of instruments for measuring, testing and navigation	1.4	0.6		238	134		93	51		68.4	90.1		42.6	59.1	
Total Blue Economy			472.4	516.2		94,017	92,694		35,825	36,111		91.7	83.3		32.8	34.6	

Source: Eurostat (SB S), DCF and own calculations.

ANNEX I: **SUMMARY TABLES**

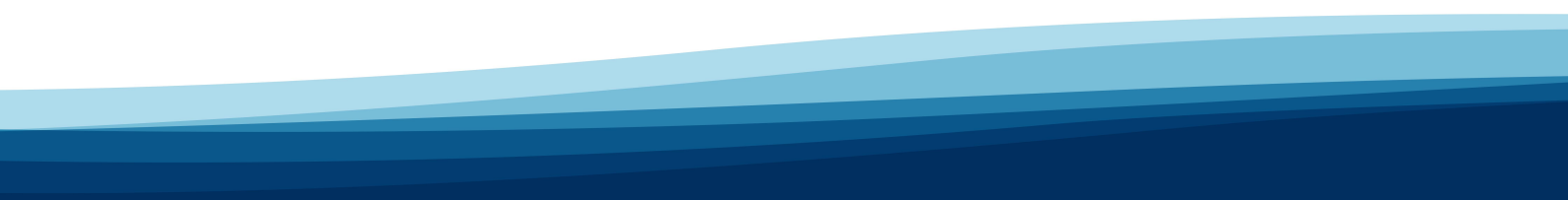


Table 20 Employment by Member State and sector, persons employed, 2017

Member State	Coastal tourism			Marine living resources			Marine non-living resources			Port activities			Shipbuilding and repair			Maritime transport			Total Blue economy		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	-	-	0.0%	2,823	25.7%	0.5%	41	355.6%	0.0%	1,513	24.6%	0.3%	1,332	18.3%	0.4%	561	1.3%	0.2%	6,269	21.8%	0.2%
BE	5,601	-12.5%	0.3%	6,619	21.9%	1.2%	617	-4.2%	0.4%	11,220	12.9%	2.0%	1,363	-53.7%	0.4%	2,205	90.9%	0.9%	27,625	4.2%	0.7%
BG	48,346	-0.4%	2.2%	8,519	10.9%	1.5%	4,232	-8.6%	2.6%	4,681	-34.6%	0.8%	5,399	-22.1%	1.7%	1,681	-5.1%	0.7%	72,857	-5.0%	1.8%
CY	14,823	22.7%	0.7%	2,398	37.0%	0.4%	509	0.2%	0.3%	899	-14.8%	0.2%	1,174	782.7%	0.4%	310	-88.8%	0.1%	20,113	9.9%	0.5%
CZ	-	-	0.0%	1,598	41.4%	0.3%	1,622	-5.4%	1.0%	6,371	39.0%	1.1%	2,320	70.1%	0.7%	557	-12.1%	0.2%	12,467	32.3%	0.3%
DE	154,086	-5.1%	7.1%	45,997	5.5%	8.0%	20,157	4.7%	12.4%	112,198	50.8%	19.5%	40,352	9.1%	12.8%	33,903	-13.1%	14.6%	406,692	8.3%	10.1%
DK	58,118	38.8%	2.7%	8,208	-4.7%	1.4%	2,997	-7.2%	1.8%	5,400	57.1%	0.9%	3,155	-28.7%	1.0%	19,414	2.5%	8.4%	97,292	20.3%	2.4%
EE	16,671	-20.3%	0.8%	4,372	1.7%	0.8%	664	-2.5%	0.4%	4,160	15.7%	0.7%	2,994	30.5%	1.0%	806	-8.8%	0.3%	29,668	-9.2%	0.7%
EL	266,292	173.0%	12.2%	38,078	-11.8%	6.7%	1,057	-64.6%	0.7%	15,464	126.4%	2.7%	8,447	-11.0%	2.7%	17,713	-9.7%	7.6%	347,051	93.2%	8.6%
ES	565,330	22.6%	26.0%	113,439	-15.9%	19.9%	7,895	-32.6%	4.9%	37,337	-27.9%	6.5%	23,510	-15.6%	7.5%	10,032	-4.9%	4.3%	757,543	8.6%	18.8%
FI	22,210	-7.9%	1.0%	4,940	3.0%	0.9%	2,149	24.4%	1.3%	7,598	-9.3%	1.3%	7,812	-29.8%	2.5%	8,932	-8.1%	3.8%	53,641	-10.4%	1.3%
FR	183,791	-6.0%	8.5%	62,092	-13.1%	10.9%	13,741	-30.3%	8.5%	59,943	1.7%	10.4%	32,703	6.2%	10.4%	15,224	-16.0%	6.6%	367,495	-6.8%	9.1%
HR	107,826	1.1%	5.0%	12,392	24.4%	2.2%	2,339	-49.2%	1.4%	5,216	-4.6%	0.9%	9,749	-44.9%	3.1%	6,644	8.3%	2.9%	144,165	-4.2%	3.6%
HU	-	-	0.0%	3,370	28.5%	0.6%	156	52.9%	0.1%	8,716	41.7%	1.5%	3,717	326.3%	1.2%	879	-16.8%	0.4%	16,838	55.9%	0.4%
IE	36,463	43.8%	1.7%	7,823	-18.4%	1.4%	840	-66.1%	0.5%	1,160	7.5%	0.2%	781	-0.3%	0.2%	732	-18.5%	0.3%	47,798	19.0%	1.2%
IT	203,377	-13.8%	9.4%	74,085	0.7%	13.0%	15,252	-22.2%	9.4%	35,204	-9.4%	6.1%	35,209	-22.8%	11.2%	49,935	44.8%	21.5%	413,063	-7.8%	10.2%
LT	2,571	-21.1%	0.1%	7,853	19.8%	1.4%	1,245	13.2%	0.8%	4,043	4.9%	0.7%	4,765	-20.3%	1.5%	1,311	-26.2%	0.6%	21,788	-3.3%	0.5%
LU	-	-	0.0%	11	-15.4%	0.0%	-	-	0.0%	58	-49.3%	0.0%	-	-	0.0%	-	-	0.0%	69	-45.8%	0.0%
LV	8,429	-10.0%	0.4%	5,811	-24.8%	1.0%	946	13.2%	0.6%	6,225	37.7%	1.1%	2,640	-1.5%	0.8%	892	-13.1%	0.4%	24,943	-4.7%	0.6%
MT	9,747	-9.5%	0.4%	1,900	2.6%	0.3%	108	-16.3%	0.1%	458	-9.7%	0.1%	373	28.2%	0.1%	147	-7.0%	0.1%	12,733	-7.1%	0.3%
NL	32,904	6.8%	1.5%	19,932	14.5%	3.5%	2,485	1.8%	1.5%	32,142	20.3%	5.6%	17,838	1.9%	5.7%	22,521	-11.7%	9.7%	127,822	6.2%	3.2%
PL	43,816	-38.0%	2.0%	38,070	34.2%	6.7%	23,840	66.4%	14.7%	29,238	4.5%	5.1%	23,261	-20.5%	7.4%	3,783	0.1%	1.6%	162,008	-7.1%	4.0%
PT	133,118	65.8%	6.1%	36,343	-11.8%	6.4%	2,497	-44.6%	1.5%	4,157	-7.7%	0.7%	3,476	-28.3%	1.1%	1,272	-6.9%	0.5%	180,864	32.3%	4.5%
RO	12,580	-28.6%	0.6%	8,211	17.2%	1.4%	10,677	-26.8%	6.6%	12,369	-37.7%	2.2%	24,632	-20.1%	7.8%	2,463	-27.5%	1.1%	70,933	-24.0%	1.8%
SE	46,077	2.7%	2.1%	8,307	6.2%	1.5%	1,969	-28.5%	1.2%	3,870	-3.6%	0.7%	6,158	-6.1%	2.0%	13,594	-22.7%	5.9%	79,974	-4.4%	2.0%
SI	1,202	-2.0%	0.1%	838	3.1%	0.1%	617	-10.2%	0.4%	2,210	-16.6%	0.4%	877	7.4%	0.3%	268	-14.6%	0.1%	6,013	-7.6%	0.1%
SK	-	-	0.0%	1,204	-1.0%	0.2%	217	-19.0%	0.1%	3,769	150.7%	0.7%	572	-31.3%	0.2%	387	-39.0%	0.2%	6,149	38.1%	0.2%
UK	201,349	-18.5%	9.3%	46,243	-0.6%	8.1%	43,506	8.8%	26.8%	158,456	107.7%	27.6%	50,542	11.3%	16.0%	16,075	-6.7%	6.9%	516,171	9.3%	12.8%
EU	2,174,728	11.3%	-	571,478	-3.3%	-	162,374	-7.3%	-	574,072	26.1%	-	315,150	-8.8%	-	232,241	-2.9%	-	4,030,042	7.2%	-

Source: Eurostat (SBS), DCF and own calculations.

Table 21 Value added at factor costs (GVA) by Member State and sector € million, 2017

Member State	Coastal tourism			Marine living resources			Marine non-living resources			Port activities			Shipbuilding and repair			Maritime transport			Total Blue economy		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	-		0.0%	171	21.4%	0.8%	2	-2500.0%	0.0%	193	101.5%	0.6%	93	90.3%	0.6%	40	7.0%	0.2%	499	54.7%	0.3%
BE	270	-8.2%	0.4%	435	26.5%	2.1%	94	-0.5%	0.4%	1,566	2.3%	4.5%	97	-55.9%	0.7%	1,109	285.2%	5.1%	3,570	28.9%	2.0%
BG	399	74.3%	0.6%	75	60.1%	0.4%	83	39.8%	0.4%	68	-43.0%	0.2%	75	18.0%	0.5%	32	-6.8%	0.1%	732	32.5%	0.4%
CY	420	31.5%	0.6%	35	75.9%	0.2%	43	-1.2%	0.2%	82	-3.7%	0.2%	43	732.7%	0.3%	0	-99.7%	0.0%	623	9.6%	0.3%
CZ	-		0.0%	36	51.0%	0.2%	30	0.0%	0.1%	200	-10.8%	0.6%	51	90.1%	0.3%	8	5.1%	0.0%	324	4.0%	0.2%
DE	4,658	8.1%	7.2%	2,319	20.0%	11.2%	1,877	-11.4%	8.2%	6,589	67.2%	19.1%	2,986	40.9%	20.1%	4,524	-48.9%	20.6%	22,953	-1.4%	12.8%
DK	2,517	52.3%	3.9%	899	39.3%	4.3%	1,678	-67.9%	7.4%	706	81.3%	2.1%	279	-2.5%	1.9%	2,805	26.3%	12.8%	8,884	-14.8%	4.9%
EE	252	36.3%	0.4%	46	8.1%	0.2%	25	88.1%	0.1%	255	17.7%	0.7%	71	53.9%	0.5%	34	27.8%	0.2%	682	28.8%	0.4%
EL	3,342	47.3%	5.1%	637	106.2%	3.1%	57	-72.1%	0.2%	767	131.8%	2.2%	186	-57.8%	1.3%	1,025	1.0%	4.7%	6,014	31.6%	3.3%
ES	17,543	37.5%	26.9%	3,539	14.6%	17.1%	444	-39.0%	2.0%	3,060	-14.9%	8.9%	869	-29.3%	5.9%	828	20.5%	3.8%	26,284	19.0%	14.6%
FI	984	16.2%	1.5%	218	8.0%	1.1%	151	21.3%	0.7%	569	6.0%	1.7%	438	-18.8%	3.0%	710	23.2%	3.2%	3,071	8.6%	1.7%
FR	8,800	6.8%	13.5%	2,909	14.4%	14.1%	1,343	-27.0%	5.9%	4,044	-12.0%	11.7%	2,118	45.2%	14.3%	962	34.1%	4.4%	20,177	4.0%	11.2%
HR	2,501	54.7%	3.8%	116	63.9%	0.6%	97	59.0%	0.4%	131	-10.7%	0.4%	95	-65.8%	0.6%	175	-12.6%	0.8%	3,115	31.3%	1.7%
HU	-		0.0%	83	74.3%	0.4%	4	-50.7%	0.0%	180	-25.8%	0.5%	73	422.8%	0.5%	19	109.8%	0.1%	359	12.0%	0.2%
IE	1,320	73.3%	2.0%	413	75.7%	2.0%	55	-8.8%	0.2%	88	5.4%	0.3%	54	10.0%	0.4%	217	66.8%	1.0%	2,147	62.7%	1.2%
IT	7,081	17.3%	10.9%	2,716	14.1%	13.1%	1,785	-27.2%	7.8%	2,194	26.6%	6.4%	2,085	10.3%	14.1%	3,906	43.3%	17.8%	19,766	14.8%	11.0%
LT	35	49.0%	0.1%	130	55.0%	0.6%	40	145.1%	0.2%	144	27.6%	0.4%	96	24.1%	0.6%	37	-34.5%	0.2%	482	30.1%	0.3%
LU	-		0.0%	0	33.3%	0.0%	-		0.0%	5	-11.4%	0.0%	-		0.0%	-		0.0%	6	-9.3%	0.0%
LV	100	16.1%	0.2%	71	15.1%	0.3%	16	-28.4%	0.1%	224	75.3%	0.7%	33	7.3%	0.2%	18	-14.7%	0.1%	462	32.2%	0.3%
MT	231	36.4%	0.4%	38	-5457.7%	0.2%	2	-34.6%	0.0%	34	-7.0%	0.1%	9	-27.6%	0.1%	30	1647.1%	0.1%	344	54.6%	0.2%
NL	1,056	28.1%	1.6%	1,145	39.7%	5.5%	1,924	-48.3%	8.5%	4,066	22.9%	11.8%	731	-7.1%	4.9%	1,350	3.9%	6.2%	10,272	-4.6%	5.7%
PL	678	-13.6%	1.0%	528	9.4%	2.6%	734	103.5%	3.2%	651	15.5%	1.9%	548	-23.0%	3.7%	175	2.0%	0.8%	3,314	7.8%	1.8%
PT	2,703	76.6%	4.2%	764	19.4%	3.7%	79	-51.7%	0.3%	343	10.6%	1.0%	123	2.0%	0.8%	69	10.9%	0.3%	4,081	44.4%	2.3%
RO	134	13.9%	0.2%	114	60.6%	0.6%	98	-38.2%	0.4%	256	-18.8%	0.7%	321	11.0%	2.2%	51	-18.7%	0.2%	975	-3.9%	0.5%
SE	1,946	35.3%	3.0%	448	47.0%	2.2%	205	36.6%	0.9%	353	46.7%	1.0%	393	47.7%	2.7%	806	29.5%	3.7%	4,151	37.4%	2.3%
SI	32	11.2%	0.0%	19	0.0%	0.1%	22	-15.3%	0.1%	135	23.6%	0.4%	39	172.5%	0.3%	15	25.2%	0.1%	262	25.1%	0.1%
SK	-		0.0%	1	-97.8%	0.0%	8	-21.8%	0.0%	70	-675.2%	0.2%	7	23.2%	0.0%	14	11.0%	0.1%	99	149.2%	0.1%
UK	8,114	14.2%	12.5%	2,778	35.1%	13.4%	11,860	-30.3%	52.1%	7,466	41.9%	21.7%	2,908	62.6%	19.6%	2,984	14.7%	13.6%	36,111	0.8%	20.1%
EU	65,116	26.1%		20,681	24.4%		22,757	-34.5%		34,440	21.9%		14,821	15.6%		21,944	-2.7%		179,758	7.9%	

Source: Eurostat (SBS), DCF and own calculations.

Table 22 Turnover by Member State and sector: € million, 2017

Member State	Coastal tourism			Marine living resources			Marine non-living resources			Port activities			Shipbuilding and repair			Maritime transport			Total Blue economy		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	-	-	0.0%	1,368	20.6%	1.1%	5	333.3%	0.0%	486	87.8%	0.5%	256	43.9%	0.5%	129	-6.5%	0.1%	2,244	31.2%	0.3%
BE	868	9.1%	0.5%	3,399	30.2%	2.6%	305	2.1%	0.3%	5,960	76.1%	6.7%	306	-66.2%	0.6%	3,442	98.0%	3.1%	14,280	46.8%	2.2%
BG	1,285	46.0%	0.7%	496	31.0%	0.4%	199	29.7%	0.2%	200	-46.1%	0.2%	173	2.2%	0.3%	89	-18.3%	0.1%	2,443	18.4%	0.4%
CY	1,236	32.9%	0.7%	144	49.3%	0.1%	80	1.4%	0.1%	128	4.3%	0.1%	99	738.1%	0.2%	28	-87.9%	0.0%	1,714	16.9%	0.3%
CZ	-	-	0.0%	156	36.9%	0.1%	87	0.0%	0.1%	1,275	-19.8%	1.4%	204	108.0%	0.4%	36	-21.1%	0.0%	1,758	-9.1%	0.3%
DE	12,904	10.6%	7.0%	26,869	67.2%	20.8%	6,157	21.3%	6.8%	18,220	107.1%	20.4%	11,576	33.0%	21.5%	30,205	21.6%	27.2%	105,931	41.0%	16.1%
DK	7,226	44.8%	3.9%	5,322	47.9%	4.1%	3,889	-41.1%	4.3%	1,329	44.0%	1.5%	967	-22.8%	1.8%	24,329	0.5%	21.9%	43,061	3.5%	6.5%
EE	1,072	22.9%	0.6%	297	29.3%	0.2%	61	51.2%	0.1%	487	25.9%	0.5%	280	78.3%	0.5%	545	29.3%	0.5%	2,741	30.1%	0.4%
EL	11,846	79.8%	6.4%	2,515	-17.6%	2.0%	131	-68.5%	0.1%	1,271	99.3%	1.4%	355	-49.4%	0.7%	1,990	-7.8%	1.8%	18,108	33.6%	2.8%
ES	47,001	37.2%	25.5%	19,937	8.1%	15.5%	1,168	-36.3%	1.3%	6,504	-23.1%	7.3%	3,057	-43.3%	5.7%	2,245	4.3%	2.0%	79,911	13.3%	12.1%
FI	3,482	6.2%	1.9%	1,302	27.2%	1.0%	412	-2.4%	0.5%	1,244	6.0%	1.4%	2,092	-17.5%	3.9%	2,427	0.4%	2.2%	10,958	1.0%	1.7%
FR	26,527	13.2%	14.4%	15,080	17.1%	11.7%	4,484	-20.4%	4.9%	12,718	28.6%	14.3%	7,695	11.9%	14.3%	14,448	28.9%	13.0%	80,952	15.8%	12.3%
HR	6,014	26.3%	3.3%	429	33.1%	0.3%	219	15.2%	0.2%	330	4.2%	0.4%	491	-49.4%	0.9%	516	-4.9%	0.5%	7,999	12.6%	1.2%
HU	-	-	0.0%	594	27.2%	0.5%	10	-34.7%	0.0%	498	-30.3%	0.6%	251	473.4%	0.5%	88	20.2%	0.1%	1,439	9.7%	0.2%
IE	3,806	34.2%	2.1%	1,109	27.8%	0.9%	175	-75.9%	0.2%	274	3.8%	0.3%	125	-0.3%	0.2%	743	3.8%	0.7%	6,233	12.5%	0.9%
IT	20,756	8.4%	11.3%	18,003	20.5%	14.0%	33,466	-23.1%	36.9%	4,680	-17.3%	5.2%	8,584	0.5%	16.0%	11,318	1.4%	10.2%	96,807	-6.0%	14.7%
LT	119	8.1%	0.1%	1,038	118.1%	0.8%	94	165.4%	0.1%	314	51.4%	0.4%	281	0.3%	0.5%	198	28.5%	0.2%	2,044	61.8%	0.3%
LU	-	-	0.0%	2	21.1%	0.0%	-	-	0.0%	11	-6.1%	0.0%	-	-	0.0%	-	-	0.0%	13	-2.2%	0.0%
LV	378	9.1%	0.2%	368	6.0%	0.3%	56	-3.6%	0.1%	467	26.0%	0.5%	85	12.7%	0.2%	47	-2.3%	0.0%	1,401	12.5%	0.2%
MT	739	24.8%	0.4%	333	71.0%	0.3%	6	-23.7%	0.0%	62	-11.4%	0.1%	27	35.8%	0.1%	42	793.6%	0.0%	1,209	36.0%	0.2%
NL	3,163	19.4%	1.7%	7,955	57.7%	6.2%	8,225	-43.6%	9.1%	7,959	12.6%	8.9%	4,455	-5.4%	8.3%	5,149	11.1%	4.6%	36,906	-4.6%	5.6%
PL	2,529	-13.3%	1.4%	4,530	49.2%	3.5%	1,022	24.9%	1.1%	2,593	36.0%	2.9%	1,964	2.3%	3.7%	471	-13.0%	0.4%	13,108	17.7%	2.0%
PT	8,356	79.7%	4.5%	3,968	4.0%	3.1%	254	-38.7%	0.3%	735	18.1%	0.8%	403	3.5%	0.7%	356	8.3%	0.3%	14,071	37.7%	2.1%
RO	564	5.4%	0.3%	517	8.3%	0.4%	1,081	-2.3%	1.2%	635	-26.7%	0.7%	1,074	-8.3%	2.0%	163	-15.7%	0.1%	4,033	-7.3%	0.6%
SE	5,647	14.0%	3.1%	2,273	37.2%	1.8%	680	33.2%	0.7%	680	33.1%	0.8%	1,267	25.6%	2.4%	3,667	-0.6%	3.3%	14,214	15.3%	2.2%
SI	117	3.3%	0.1%	146	72.2%	0.1%	62	-7.5%	0.1%	294	23.7%	0.3%	90	23.8%	0.2%	49	-18.3%	0.0%	757	19.3%	0.1%
SK	-	-	0.0%	374	142.5%	0.3%	14	-17.9%	0.0%	429	300.3%	0.5%	29	-25.2%	0.1%	80	40.6%	0.1%	926	147.7%	0.1%
UK	18,604	-1.1%	10.1%	10,396	16.3%	8.1%	28,328	-31.5%	31.2%	19,421	82.4%	21.8%	7,603	47.9%	14.1%	8,343	-8.3%	7.5%	92,694	-1.4%	14.1%
EU	184,236	22.7%		128,918	28.4%		90,669	-26.9%		89,204	36.0%		53,790	4.5%		111,140	10.1%		657,956	11.0%	

Source: Eurostat (SBS), DCF and own calculations.

Table 23 Personnel costs by Member State and sector, € million, 2017

Member State	Coastal tourism			Marine living resources			Marine non-living resources			Port activities			Shipbuilding and repair			Maritime transport			Total Blue economy		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	-	-	0.0%	119	35.3%	1.0%	2	130.8%	0.0%	60	43.2%	0.3%	69	46.2%	0.6%	17	-10.1%	0.2%	267	35.6%	0.3%
BE	178	-9.7%	0.4%	265	28.2%	2.3%	47	23.4%	0.5%	851	15.2%	4.1%	70	-56.4%	0.6%	154	146.3%	1.5%	1,564	11.5%	1.5%
BG	204	56.3%	0.5%	34	67.5%	0.3%	34	42.8%	0.4%	34	-30.8%	0.2%	47	14.3%	0.4%	15	2.7%	0.1%	368	31.8%	0.4%
CY	225	-3.9%	0.5%	18	30.8%	0.2%	18	1.7%	0.2%	31	-24.8%	0.2%	36	1237.0%	0.3%	8	-84.3%	0.1%	336	-6.7%	0.3%
CZ	-	-	0.0%	20	60.4%	0.2%	22	-10.4%	0.2%	99	47.8%	0.5%	29	97.8%	0.3%	5	-20.9%	0.1%	176	39.8%	0.2%
DE	3,237	9.4%	7.8%	1,550	33.6%	13.6%	1,164	12.4%	12.1%	4,169	60.4%	20.0%	2,432	20.8%	21.5%	1,467	-11.1%	14.5%	14,018	22.8%	13.4%
DK	1,742	35.5%	4.2%	431	15.5%	3.8%	281	1.0%	2.9%	338	68.0%	1.6%	190	-31.6%	1.7%	1,512	25.6%	14.9%	4,484	24.1%	4.3%
EE	184	11.2%	0.4%	33	24.1%	0.3%	13	50.6%	0.1%	94	49.2%	0.4%	54	83.2%	0.5%	23	43.8%	0.2%	401	29.7%	0.4%
EL	2,227	53.6%	5.3%	242	-16.3%	2.1%	30	-70.7%	0.3%	688	279.9%	3.3%	143	-38.7%	1.3%	740	22.1%	7.3%	4,069	42.2%	3.9%
ES	11,357	18.1%	27.2%	1,941	-1.1%	17.0%	328	-19.1%	3.4%	1,627	-20.4%	7.8%	883	-17.8%	7.8%	298	-4.5%	2.9%	16,434	6.6%	15.7%
FI	711	-1.0%	1.7%	126	11.9%	1.1%	92	37.1%	0.9%	346	-2.1%	1.7%	362	-18.9%	3.2%	429	-2.5%	4.2%	2,066	-3.3%	2.0%
FR	6,812	2.9%	16.3%	1,922	12.1%	16.9%	778	-17.0%	8.1%	3,192	16.8%	15.3%	1,758	13.4%	15.6%	952	1.8%	9.4%	15,414	6.4%	14.7%
HR	1,242	16.7%	3.0%	68	-4.9%	0.6%	53	6.8%	0.5%	80	-5.7%	0.4%	139	-41.9%	1.2%	90	-11.7%	0.9%	1,671	3.8%	1.6%
HU	-	-	0.0%	37	51.0%	0.3%	2	142.9%	0.0%	89	38.0%	0.4%	44	417.9%	0.4%	8	-21.6%	0.1%	180	66.1%	0.2%
IE	946	46.9%	2.3%	209	24.6%	1.8%	45	-76.6%	0.5%	58	12.4%	0.3%	29	3.6%	0.3%	30	-33.4%	0.3%	1,316	16.6%	1.3%
IT	4,155	-2.3%	10.0%	1,288	6.2%	11.3%	1,126	1.4%	11.7%	1,341	9.7%	6.4%	1,456	-7.2%	12.9%	1,739	10.5%	17.2%	11,104	1.5%	10.6%
LT	20	4.0%	0.0%	80	66.1%	0.7%	17	29.8%	0.2%	61	27.9%	0.3%	67	-5.4%	0.6%	29	-1.0%	0.3%	274	20.1%	0.3%
LU	-	-	0.0%	0	33.3%	0.0%	-	-	0.0%	3	-43.6%	0.0%	-	-	0.0%	-	-	0.0%	3	-39.3%	0.0%
LV	66	10.2%	0.2%	41	20.2%	0.4%	8	43.9%	0.1%	93	75.6%	0.4%	22	27.5%	0.2%	10	-22.1%	0.1%	241	31.3%	0.2%
MT	128	16.6%	0.3%	13	17.8%	0.1%	1	-7.7%	0.0%	13	41.0%	0.1%	5	25.0%	0.0%	14	7.1%	0.1%	174	17.4%	0.2%
NL	640	13.2%	1.5%	605	36.8%	5.3%	355	47.0%	3.7%	2,045	22.2%	9.8%	618	12.4%	5.5%	462	35.5%	4.6%	4,725	23.9%	4.5%
PL	337	-19.9%	0.8%	310	49.4%	2.7%	315	105.6%	3.3%	363	22.0%	1.7%	319	-8.4%	2.8%	50	-8.0%	0.5%	1,694	14.4%	1.6%
PT	1,588	50.1%	3.8%	390	3.0%	3.4%	48	-38.9%	0.5%	150	-0.9%	0.7%	85	3.8%	0.7%	28	-23.4%	0.3%	2,288	28.2%	2.2%
RO	72	2.1%	0.2%	40	60.8%	0.3%	55	7.4%	0.6%	130	-21.1%	0.6%	248	4.3%	2.2%	23	-9.7%	0.2%	568	-1.2%	0.5%
SE	1,470	26.8%	3.5%	257	45.2%	2.3%	100	-6.0%	1.0%	253	37.0%	1.2%	303	17.0%	2.7%	669	6.6%	6.6%	3,052	21.4%	2.9%
SI	19	-5.4%	0.0%	11	5.6%	0.1%	13	-2.3%	0.1%	65	1.5%	0.3%	19	27.5%	0.2%	7	-14.3%	0.1%	135	2.4%	0.1%
SK	-	-	0.0%	16	6.9%	0.1%	7	-14.6%	0.1%	63	215.7%	0.3%	5	-32.9%	0.0%	8	-3.6%	0.1%	100	67.4%	0.1%
UK	4,139	-4.9%	9.9%	1,321	20.5%	11.6%	4,699	-2.7%	48.7%	4,490	78.0%	21.6%	1,853	26.1%	16.4%	1,347	11.3%	13.3%	17,849	15.3%	17.0%
EU	41,698	12.2%		11,389	15.0%		9,652	-1.4%		20,826	32.4%		11,284	4.5%		10,134	7.6%		104,984	13.1%	

Source: Eurostat (SBS), DCF and own calculations.

Table 24 Gross investments in tangible assets by Member State and sector, € million, 2017

Member State	Marine living resources			Marine non-living resources			Port activities			Shipbuilding and repair			Maritime transport			Total Blue economy		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	14	21.6%	0.9%	1	0.0%	0.0%	35	7.8%	0.5%	7	20.8%	0.3%	4	-74.1%	0.0%	60	-6.1%	0.2%
BE	76	-28.8%	4.9%	16	-45.5%	0.1%	458	-25.0%	6.1%	13	-46.5%	0.6%	1,674	106.9%	16.4%	2,237	41.6%	6.6%
BG	11	13.4%	0.7%	28	-16.5%	0.2%	25	-35.4%	0.3%	10	-61.6%	0.5%	5	-73.2%	0.0%	78	-37.5%	0.2%
CY	2	-36.0%	0.1%	10	-53.4%	0.1%	17	35.6%	0.2%	1	0.0%	0.1%	0	-60.0%	0.0%	30	-20.7%	0.1%
CZ	6	182.5%	0.4%	2	0.0%	0.0%	54	-34.3%	0.7%	13	70.7%	0.7%	2	-12.8%	0.0%	77	-19.7%	0.2%
DE	215	72.7%	13.7%	586	-7.1%	4.7%	993	27.2%	13.2%	271	42.8%	13.6%	1,914	0.3%	18.8%	3,979	9.5%	11.8%
DK	93	-3.7%	5.9%	766	28.7%	6.1%	262	85.0%	3.5%	24	30.6%	1.2%	2,392	-28.3%	23.5%	3,537	-15.5%	10.5%
EE	7	2.1%	0.4%	10	104.2%	0.1%	49	-65.7%	0.7%	9	38.8%	0.5%	46	487.2%	0.4%	121	-28.7%	0.4%
EL	16	-45.9%	1.0%	2	-89.2%	0.0%	40	-23.2%	0.5%	8	-70.2%	0.4%	129	70.0%	1.3%	195	-3.0%	0.6%
ES	202	-23.9%	12.8%	186	38.6%	1.5%	619	-23.9%	8.2%	95	-32.3%	4.8%	119	-2.9%	1.2%	1,220	-17.3%	3.6%
FI	26	15.1%	1.6%	65	68.0%	0.5%	267	36.1%	3.5%	28	-23.5%	1.4%	131	-26.9%	1.3%	517	9.3%	1.5%
FR	192	36.8%	12.2%	351	-39.3%	2.8%	1,225	4.9%	16.2%	343	-40.7%	17.2%	759	-78.5%	7.4%	2,870	-52.2%	8.5%
HR	7	-38.7%	0.4%	11	-12.0%	0.1%	20	-5.4%	0.3%	17	-46.2%	0.9%	31	-36.6%	0.3%	85	-31.5%	0.3%
HU	12	103.9%	0.8%	1	-93.3%	0.0%	52	-44.4%	0.7%	13	908.8%	0.7%	4	11.8%	0.0%	82	-30.0%	0.2%
IE	7	11.2%	0.5%	6	-68.3%	0.0%	31	-38.2%	0.4%	8	300.1%	0.4%	59	-11.2%	0.6%	111	-23.0%	0.3%
IT	166	-10.5%	10.6%	740	-34.3%	5.9%	166	-76.2%	2.2%	387	0.3%	19.4%	393	-92.3%	3.9%	1,852	-75.3%	5.5%
LT	19	35.5%	1.2%	14	127.9%	0.1%	48	-8.3%	0.6%	7	22.4%	0.3%	74	813.6%	0.7%	162	87.4%	0.5%
LU	-	0.0%	0.0%	-	0.0%	0.0%	1	-55.8%	0.0%	-	-	0.0%	-	-	0.0%	1	-55.8%	0.0%
LV	7	-36.4%	0.4%	10	4.3%	0.1%	33	66.8%	0.4%	6	-29.3%	0.3%	16	64.9%	0.2%	71	23.2%	0.2%
MT	1	-12.5%	0.1%	-	-100.0%	0.0%	3	-45.7%	0.0%	20	-	1.0%	2	4.8%	0.0%	26	203.3%	0.1%
NL	87	27.4%	5.5%	269	-38.7%	2.2%	1,008	28.6%	13.4%	79	1.8%	4.0%	845	-13.9%	8.3%	2,288	-2.6%	6.8%
PL	79	35.2%	5.0%	111	5.0%	0.9%	173	55.2%	2.3%	65	-7.3%	3.3%	29	47.2%	0.3%	457	25.0%	1.4%
PT	69	-28.7%	4.4%	22	-66.7%	0.2%	72	-67.7%	1.0%	22	54.5%	1.1%	21	-33.9%	0.2%	206	-52.2%	0.6%
RO	12	-77.0%	0.7%	83	36.2%	0.7%	174	17.3%	2.3%	46	-55.6%	2.3%	14	41.4%	0.1%	329	-12.0%	1.0%
SE	33	-20.0%	2.1%	66	49.4%	0.5%	136	52.5%	1.8%	45	20.1%	2.3%	397	-5.9%	3.9%	676	6.8%	2.0%
SI	1	23.8%	0.1%	7	-41.6%	0.1%	25	-54.5%	0.3%	4	5.1%	0.2%	1	-98.7%	0.0%	38	-76.8%	0.1%
SK	4	-16.4%	0.2%	1	500.0%	0.0%	22	244.9%	0.3%	2	198.4%	0.1%	2	-48.9%	0.0%	31	89.3%	0.1%
UK	209	109.6%	13.3%	9,115	-49.2%	73.1%	1,530	26.4%	20.3%	449	198.6%	22.5%	1,130	217.2%	11.1%	12,432	-37.1%	36.8%
EU	1,570	6.7%		12,475	-43.2%		7,537	-1.3%		1,994	2.0%		10,191	-40.6%		33,768	-32.7%	

Notes: Data for Coastal Tourism are not available.

Source: Eurostat (SBS), DCF and own calculations.

Table 25 Employment in Coastal tourism by Member State and sub-sector, persons employed, 2017

Member State	Accommodation			Transport			Other expenditure			Total		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
BE	2,664	-14.2%	0.3%	1,399	-21.4%	0.6%	1,537	1.7%	0.2%	5,601	-12.5%	0.3%
BG	26,110	10.2%	2.6%	3,405	6.2%	1.4%	18,832	-12.9%	2.0%	48,346	-0.4%	2.2%
CY	7,988	-3.9%	0.8%	1,941	17.4%	0.8%	4,894	131.3%	0.5%	14,823	22.7%	0.7%
CZ	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
DE	80,560	-10.1%	8.1%	34,020	-5.8%	14.5%	39,506	7.8%	4.2%	154,086	-5.1%	7.1%
DK	23,820	19.9%	2.4%	9,786	20.8%	4.2%	24,512	76.4%	2.6%	58,118	38.8%	2.7%
EE	5,501	-11.3%	0.6%	765	-40.3%	0.3%	10,405	-22.6%	1.1%	16,671	-20.3%	0.8%
EL	126,652	126.0%	12.8%	12,094	86.6%	5.1%	127,547	264.4%	13.4%	266,292	173.0%	12.2%
ES	224,128	3.6%	22.6%	50,989	31.0%	21.7%	290,213	41.0%	30.6%	565,330	22.6%	26.0%
FI	5,722	-2.9%	0.6%	4,960	-29.5%	2.1%	11,528	3.1%	1.2%	22,210	-7.9%	1.0%
FR	65,919	-0.2%	6.7%	33,721	-23.1%	14.4%	84,151	-1.6%	8.9%	183,791	-6.0%	8.5%
HR	48,708	-15.6%	4.9%	12,509	29.7%	5.3%	46,609	18.7%	4.9%	107,826	1.1%	5.0%
HU	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
IE	20,842	42.2%	2.1%	3,139	3.4%	1.3%	12,481	62.9%	1.3%	36,463	43.8%	1.7%
IT	106,668	-17.7%	10.8%	16,605	-32.2%	7.1%	80,105	-2.3%	8.4%	203,377	-13.8%	9.4%
LT	1,327	-16.6%	0.1%	425	-26.9%	0.2%	819	-24.7%	0.1%	2,571	-21.1%	0.1%
LU	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
LV	2,846	-14.7%	0.3%	1,152	-32.3%	0.5%	4,431	2.3%	0.5%	8,429	-10.0%	0.4%
MT	5,585	-18.7%	0.6%	548	10.7%	0.2%	3,614	6.0%	0.4%	9,747	-9.5%	0.4%
NL	19,276	-6.7%	1.9%	689	-17.9%	0.3%	12,939	38.8%	1.4%	32,904	6.8%	1.5%
PL	19,459	-41.4%	2.0%	6,699	-50.2%	2.9%	17,657	-26.7%	1.9%	43,816	-38.0%	2.0%
PT	66,624	43.9%	6.7%	6,676	51.1%	2.8%	59,818	102.4%	6.3%	133,118	65.8%	6.1%
RO	5,800	-21.2%	0.6%	1,265	-40.1%	0.5%	5,515	-32.4%	0.6%	12,580	-28.6%	0.6%
SE	22,306	14.8%	2.3%	6,598	-33.4%	2.8%	17,172	10.5%	1.8%	46,077	2.7%	2.1%
SI	788	1.5%	0.1%	45	-23.0%	0.0%	369	-5.7%	0.0%	1,202	-2.0%	0.1%
SK	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
UK	101,159	-15.0%	10.2%	25,462	-33.2%	10.8%	74,727	-16.8%	7.9%	201,349	-18.5%	9.3%
EU	990,452	3.6%		234,892	-8.7%		949,383	28.1%		2,174,728	11.3%	

Source: Eurostat (SBS), DCF and own calculations.

Table 26 GVA in Coastal tourism by Member State and sub-sector, € million, (2017)

Member State	Accommodation			Transport			Other expenditure			Total		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
BE	125	-4.8%	0.4%	94	-17.2%	0.7%	50	4.1%	0.3%	270	-8.2%	0.4%
BG	273	88.5%	0.8%	38	57.6%	0.3%	89	47.0%	0.5%	399	74.3%	0.6%
CY	265	12.5%	0.8%	50	26.4%	0.4%	105	135.1%	0.6%	420	31.5%	0.6%
CZ	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
DE	2,175	10.3%	6.7%	1,606	-0.7%	11.4%	877	21.6%	4.8%	4,658	8.1%	7.2%
DK	1,061	43.1%	3.2%	769	52.8%	5.5%	687	68.6%	3.7%	2,517	52.3%	3.9%
EE	94	74.0%	0.3%	21	-6.8%	0.1%	137	26.3%	0.7%	252	36.3%	0.4%
EL	2,476	46.6%	7.6%	454	228.9%	3.2%	413	-6.7%	2.2%	3,342	47.3%	5.1%
ES	9,131	34.4%	28.0%	2,980	69.9%	21.1%	5,432	28.9%	29.6%	17,543	37.5%	26.9%
FI	248	31.3%	0.8%	350	12.6%	2.5%	387	11.1%	2.1%	984	16.2%	1.5%
FR	2,945	8.6%	9.0%	2,556	-1.6%	18.1%	3,300	12.5%	18.0%	8,800	6.8%	13.5%
HR	1,593	45.7%	4.9%	322	105.3%	2.3%	586	60.0%	3.2%	2,501	54.7%	3.8%
HU	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
IE	701	113.8%	2.1%	237	15.0%	1.7%	382	68.0%	2.1%	1,320	73.3%	2.0%
IT	4,323	19.3%	13.2%	983	8.3%	7.0%	1,775	17.8%	9.7%	7,081	17.3%	10.9%
LT	19	51.4%	0.1%	9	50.6%	0.1%	7	41.0%	0.0%	35	49.0%	0.1%
LU	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
LV	34	22.8%	0.1%	27	-20.5%	0.2%	38	61.0%	0.2%	100	16.1%	0.2%
MT	165	33.7%	0.5%	14	33.0%	0.1%	53	46.6%	0.3%	231	36.4%	0.4%
NL	533	31.4%	1.6%	238	-1.6%	1.7%	286	60.8%	1.6%	1,056	28.1%	1.6%
PL	325	-11.8%	1.0%	164	-23.0%	1.2%	189	-6.8%	1.0%	678	-13.6%	1.0%
PT	1,577	68.3%	4.8%	280	56.2%	2.0%	846	104.2%	4.6%	2,703	76.6%	4.2%
RO	62	1.9%	0.2%	18	8.7%	0.1%	54	34.2%	0.3%	134	13.9%	0.2%
SE	921	53.0%	2.8%	396	-2.4%	2.8%	629	46.2%	3.4%	1,946	35.3%	3.0%
SI	21	13.1%	0.1%	3	-5.3%	0.0%	7	13.7%	0.0%	32	11.2%	0.0%
SK	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
UK	3,582	10.6%	11.0%	2,491	15.3%	17.7%	2,041	19.7%	11.1%	8,114	14.2%	12.5%
EU	32,649	28.0%		14,099	20.9%		18,368	26.9%		65,116	26.1%	

Source: Eurostat (SBS), DCF and own calculations.

Table 27 Employment in Living resources by Member State and sub-sector, persons employed, 2017

Member State	Aquaculture			Capture fisheries			Processing and distribution			Total		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	261	127.0%	0.4%	-	-	0.0%	2,562	20.2%	0.7%	2,823	25.7%	0.5%
BE	5	-70.6%	0.0%	316	-24.9%	0.2%	6,298	26.1%	1.8%	6,619	21.9%	1.2%
BG	1,093	223.4%	1.5%	1,491	24.8%	1.0%	5,935	-3.4%	1.7%	8,519	10.9%	1.5%
CY	486	61.5%	0.7%	1,160	27.6%	0.8%	752	39.2%	0.2%	2,398	37.0%	0.4%
CZ	459	40.4%	0.6%	-	-	0.0%	1,139	41.8%	0.3%	1,598	41.4%	0.3%
DE	967	25.4%	1.3%	1,492	-2.4%	1.0%	43,537	5.4%	12.5%	45,997	5.5%	8.0%
DK	549	12.0%	0.8%	1,259	-25.7%	0.8%	6,400	-0.5%	1.8%	8,208	-4.7%	1.4%
EE	26	30.0%	0.0%	2,135	12.4%	1.4%	2,211	-7.1%	0.6%	4,372	1.7%	0.8%
EL	3,786	-7.0%	5.2%	24,744	-10.2%	16.4%	9,548	-17.4%	2.7%	38,078	-11.8%	6.7%
ES	17,811	-38.3%	24.5%	30,930	-18.7%	20.5%	64,698	-4.8%	18.6%	113,439	-15.9%	19.9%
FI	584	30.1%	0.8%	1,399	-3.3%	0.9%	2,957	2.0%	0.9%	4,940	3.0%	0.9%
FR	15,074	-22.3%	20.7%	13,463	-14.8%	8.9%	33,555	-7.4%	9.7%	62,092	-13.1%	10.9%
HR	2,196	-20.1%	3.0%	7,994	63.0%	5.3%	2,202	-4.4%	0.6%	12,392	24.4%	2.2%
HU	367	63.1%	0.5%	-	-	0.0%	3,003	25.3%	0.9%	3,370	28.5%	0.6%
IE	1,948	-0.2%	2.7%	3,255	-33.4%	2.2%	2,619	-4.6%	0.8%	7,823	-18.4%	1.4%
IT	6,813	15.8%	9.4%	25,768	-11.8%	17.0%	41,504	8.0%	11.9%	74,085	0.7%	13.0%
LT	143	160.0%	0.2%	591	-17.0%	0.4%	7,120	23.0%	2.0%	7,853	19.8%	1.4%
LU	-	0.0%	0.0%	-	-	0.0%	11	-15.4%	0.0%	11	-15.4%	0.0%
LV	250	125.2%	0.3%	607	-63.6%	0.4%	4,954	-16.8%	1.4%	5,811	-24.8%	1.0%
MT	224	29.5%	0.3%	1,146	-2.2%	0.8%	530	4.6%	0.2%	1,900	2.6%	0.3%
NL	488	0.0%	0.7%	2,039	-2.3%	1.3%	17,405	17.4%	5.0%	19,932	14.5%	3.5%
PL	8,856	n/a	12.2%	2,432	-9.9%	1.6%	26,783	4.6%	7.7%	38,070	n/a	6.7%
PT	2,651	15.0%	3.6%	14,917	-16.5%	9.9%	18,776	-10.7%	5.4%	36,343	-11.8%	6.4%
RO	3,660	37.2%	5.0%	757	161.8%	0.5%	3,795	-6.2%	1.1%	8,211	17.2%	1.4%
SE	662	56.1%	0.9%	1,385	-21.3%	0.9%	6,260	11.0%	1.8%	8,307	6.2%	1.5%
SI	69	25.5%	0.1%	111	-5.4%	0.1%	658	2.8%	0.2%	838	3.1%	0.1%
SK	59	293.3%	0.1%	-	-	0.0%	1,145	-4.7%	0.3%	1,204	-1.0%	0.2%
UK	3,314	15.1%	4.6%	11,774	-3.6%	7.8%	31,155	-0.8%	9.0%	46,243	-0.6%	8.1%
EU	72,801	-3.2%		151,163	-11.1%		347,513	0.5%		571,478	-3.3%	

Source: Eurostat (SBS), DCF and own calculations.

Table 28 GVA in Living resources by Member State and sub-sector, € million, 2017

Member State	Aquaculture			Capture fisheries			Processing and distribution				Total	
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	8	105.5%	0.4%	-	-	0.0%	163	19.1%	1.2%	171	21.4%	0.8%
BE	0	-73.2%	0.0%	47	56.9%	1.0%	388	23.8%	2.8%	435	26.5%	2.1%
BG	12	73.6%	0.6%	3	-27.0%	0.1%	60	66.5%	0.4%	75	60.1%	0.4%
CY	15	157.9%	0.8%	3	-583.3%	0.1%	17	16.8%	0.1%	35	75.9%	0.2%
CZ	14	27.0%	0.7%	-	-	0.0%	22	71.0%	0.2%	36	51.0%	0.2%
DE	40	50.5%	2.0%	96	46.7%	2.1%	2,184	18.6%	15.5%	2,319	20.0%	11.2%
DK	45	60.4%	2.2%	381	103.4%	8.2%	473	10.0%	3.4%	899	39.3%	4.3%
EE	0	-52.4%	0.0%	10	-3.8%	0.2%	36	12.9%	0.3%	46	8.1%	0.2%
EL	210	78.2%	10.5%	257	-260.5%	5.6%	169	-51.8%	1.2%	637	106.2%	3.1%
ES	239	151.7%	12.0%	1,110	25.5%	24.0%	2,190	3.8%	15.6%	3,539	14.6%	17.1%
FI	24	31.1%	1.2%	17	18.2%	0.4%	177	4.6%	1.3%	218	8.0%	1.1%
FR	421	-9.7%	21.1%	664	23.2%	14.4%	1,824	18.7%	13.0%	2,909	14.4%	14.1%
HR	49	93.6%	2.5%	27	122.5%	0.6%	39	19.6%	0.3%	116	63.9%	0.6%
HU	11	47.7%	0.6%	-	-	0.0%	72	79.2%	0.5%	83	74.3%	0.4%
IE	71	114.1%	3.6%	173	170.5%	3.7%	169	22.6%	1.2%	413	75.7%	2.0%
IT	297	42.0%	14.8%	568	-32.6%	12.3%	1,852	39.4%	13.2%	2,716	14.1%	13.1%
LT	4	134.6%	0.2%	7	-53.7%	0.1%	119	76.6%	0.8%	130	55.0%	0.6%
LU	-	0.0%	0.0%	-	-	0.0%	0	33.3%	0.0%	0	33.3%	0.0%
LV	3	272.0%	0.1%	9	-27.5%	0.2%	59	21.7%	0.4%	71	15.1%	0.3%
MT	18	-209.3%	0.9%	4	65.4%	0.1%	15	12.1%	0.1%	38	n/a	0.2%
NL	45	13.9%	2.2%	245	61.1%	5.3%	855	36.2%	6.1%	1,145	39.7%	5.5%
PL	1	28.7%	0.1%	29	20.6%	0.6%	498	8.8%	3.5%	528	9.4%	2.6%
PT	84	413.8%	4.2%	278	23.5%	6.0%	402	0.9%	2.9%	764	19.4%	3.7%
RO	63	150.8%	3.1%	3	416.7%	0.1%	48	6.2%	0.3%	114	60.6%	0.6%
SE	33	279.8%	1.7%	81	55.7%	1.7%	334	36.8%	2.4%	448	47.0%	2.2%
SI	2	-17.0%	0.1%	2	0.0%	0.0%	15	3.1%	0.1%	19	0.0%	0.1%
SK	2	259.2%	0.1%	-	-	0.0%	1	-105.5%	0.0%	1	-97.8%	0.0%
UK	287	128.0%	14.4%	610	38.0%	13.2%	1,881	26.4%	13.4%	2,778	35.1%	13.4%
EU	1,998	58.5%		4,622	35.2%		14,062	17.6%		20,681	24.4%	

Source: Eurostat (SBS), DCF and own calculations.

Table 29 Employment in Non-living resources by Member State and sub-sector, persons employed, 2017

Member State	Extraction of crude petroleum			Extraction of natural gas			Extraction of marine minerals			Supp. act. for petroleum and natural gas extraction			Support activities for other mining and quarrying			Total		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	41	355.6%	0.2%	41	355.6%	0.0%
BE	-	-	0.0%	-	-	0.0%	597	9.5%	0.7%	-	-	0.0%	20	-79.8%	0.1%	617	-4.2%	0.4%
BG	-	-	0.0%	26	25.9%	0.2%	3,862	-13.3%	4.7%	12	140.0%	0.0%	332	121.3%	1.8%	4,232	-8.6%	2.6%
CY	-	-	0.0%	-	-	0.0%	509	0.2%	0.6%	-	-	0.0%	-	-	0.0%	509	0.2%	0.3%
CZ	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	1,622	-5.4%	9.0%	1,622	-5.4%	1.0%
DE	-	-	0.0%	3,927	4.6%	26.7%	16,230	4.7%	19.9%	-	-	0.0%	-	-	0.0%	20,157	4.7%	12.4%
DK	699	33.7%	3.3%	-	-	0.0%	630	-13.6%	0.8%	1,587	-19.3%	5.9%	81	710.0%	0.5%	2,997	-7.2%	1.8%
EE	-	-	0.0%	-	-	0.0%	624	-3.3%	0.8%	-	-	0.0%	40	11.1%	0.2%	664	-2.5%	0.4%
EL	-	-	0.0%	-	-	0.0%	851	-70.0%	1.0%	151	2.2%	0.6%	55	-	0.3%	1,057	-64.6%	0.7%
ES	866	190.2%	4.1%	15	0.0%	0.1%	6,242	-44.2%	7.7%	165	-21.4%	0.6%	606	-	3.4%	7,895	-32.6%	4.9%
FI	-	-	0.0%	-	-	0.0%	1,204	-22.7%	1.5%	-	-	0.0%	945	459.2%	5.3%	2,149	24.4%	1.3%
FR	-	-	0.0%	-	-	0.0%	13,407	-31.6%	16.4%	164	273.6%	0.6%	170	109.9%	0.9%	13,741	-30.3%	8.5%
HR	-	-	0.0%	19	-99.2%	0.1%	1,353	31.1%	1.7%	920	-21.8%	3.4%	47	840.0%	0.3%	2,339	-49.2%	1.4%
HU	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	156	52.9%	0.9%	156	52.9%	0.1%
IE	-	-	0.0%	-	-	0.0%	761	-68.3%	0.9%	14	-30.9%	0.1%	65	23.8%	0.4%	840	-66.1%	0.5%
IT	65	71.7%	0.3%	8,535	-6.9%	58.1%	5,861	-39.5%	7.2%	792	10.6%	2.9%	-	-	0.0%	15,252	-22.2%	9.4%
LT	-	-	0.0%	-	-	0.0%	1,245	13.2%	1.5%	-	-	0.0%	-	-	0.0%	1,245	13.2%	0.8%
LU	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
LV	-	-	0.0%	-	-	0.0%	928	16.4%	1.1%	-	-	0.0%	18	-53.8%	0.1%	946	13.2%	0.6%
MT	-	-	0.0%	-	-	0.0%	108	-16.3%	0.1%	-	-	0.0%	-	-	0.0%	108	-16.3%	0.1%
NL	365	32.5%	1.7%	690	17.8%	4.7%	742	-19.2%	0.9%	684	3.3%	2.5%	5	-	0.0%	2,485	1.8%	1.5%
PL	-	-	0.0%	49	322.9%	0.3%	9,873	-7.8%	12.1%	1,137	8.0%	4.2%	12,780	401.8%	71.0%	23,840	66.4%	14.7%
PT	-	-	0.0%	-	-	0.0%	2,131	-48.5%	2.6%	-	-	0.0%	366	-1.9%	2.0%	2,497	-44.6%	1.5%
RO	2,884	-51.2%	13.6%	1,280	8.2%	8.7%	5,283	-9.4%	6.5%	1,040	-29.1%	3.9%	189	-3.1%	1.1%	10,677	-26.8%	6.6%
SE	-	-	0.0%	-	-	0.0%	1,889	-27.6%	2.3%	-	-	0.0%	80	-44.4%	0.4%	1,969	-28.5%	1.2%
SI	-	-	0.0%	-	-	0.0%	609	-10.3%	0.7%	-	-	0.0%	8	0.0%	0.0%	617	-10.2%	0.4%
SK	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	217	-19.0%	1.2%	217	-19.0%	0.1%
UK	16,396	13.1%	77.1%	144	-61.1%	1.0%	6,610	-31.7%	8.1%	20,202	31.8%	75.2%	154	18.5%	0.9%	43,506	8.8%	26.8%
EU	21,275	-1.2%		14,683	-16.1%		81,549	-24.0%		26,869	17.9%		17,997	193.5%		162,374	-7.3%	

Source: Eurostat (SBS), DCF and own calculations.

Table 30 GVA in Non-living resources by Member State and sub-sector, € million, 2017

Member State	Extraction of crude petroleum			Extraction of natural gas			Extraction of marine minerals			Supp. act. for petroleum and natural gas extraction			Support activities for other mining and quarrying			Total		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	2	##	0.4%	2	##	0.0%
BE	-	-	0.0%	-	-	0.0%	94	8.8%	1.9%	-	-	0.0%	0	-97.6%	0.0%	94	-0.5%	0.4%
BG	4	130.4%	0.0%	7	297.1%	0.3%	70	28.2%	1.4%	-	1	1000.0%	4	105.3%	0.6%	83	39.8%	0.4%
CY	-	-	0.0%	-	-	0.0%	43	-1.2%	0.9%	-	-	0.0%	-	-	0.0%	43	-1.2%	0.2%
CZ	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	30	0.0%	4.4%	30	0.0%	0.1%
DE	-	-	0.0%	716	-38.7%	29.8%	1,161	22.1%	23.7%	-	-	0.0%	-	-	0.0%	1,877	-11.4%	8.2%
DK	1,362	-72.2%	11.1%	-	-	0.0%	92	23.3%	1.9%	221	-15.8%	8.6%	4	366.7%	0.6%	1,678	-67.9%	7.4%
EE	-	-	0.0%	-	-	0.0%	24	89.8%	0.5%	-	-	0.0%	1	57.1%	0.2%	25	88.1%	0.1%
EL	-	-	0.0%	-	-	0.0%	46	-76.4%	0.9%	8	-7.2%	0.3%	3	-	0.5%	57	-72.1%	0.2%
ES	128	203.9%	1.1%	1	0.0%	0.0%	255	-61.0%	5.2%	26	-12.7%	1.0%	33	-	4.9%	444	-39.0%	2.0%
FI	-	-	0.0%	-	-	0.0%	88	-22.2%	1.8%	-	-	0.0%	63	452.6%	9.3%	151	21.3%	0.7%
FR	100	0.0%	0.8%	-	-	0.0%	1,183	-32.6%	24.1%	48	-472.5%	1.9%	12	##	1.7%	1,343	-27.0%	5.9%
HR	-	-	0.0%	-	-	0.0%	43	537.3%	0.9%	55	0.0%	2.1%	0	300.0%	0.0%	97	59.0%	0.4%
HU	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	4	-50.7%	0.5%	4	-50.7%	0.0%
IE	-	-	0.0%	-	-	0.0%	49	-12.5%	1.0%	4	55.6%	0.2%	3	13.0%	0.4%	55	-8.8%	0.2%
IT	65	-54.3%	0.5%	1,143	-33.3%	47.6%	374	-26.6%	7.6%	203	138.0%	7.9%	-	-	0.0%	1,785	-27.2%	7.8%
LT	-	-	0.0%	-	-	0.0%	40	145.1%	0.8%	-	-	0.0%	-	-	0.0%	40	145.1%	0.2%
LU	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
LV	-	-	0.0%	-	-	0.0%	16	-28.4%	0.3%	-	-	0.0%	-	-	0.0%	16	-28.4%	0.1%
MT	-	-	0.0%	-	-	0.0%	2	-34.6%	0.0%	-	-	0.0%	-	-	0.0%	2	-34.6%	0.0%
NL	1,091	-54.3%	8.9%	436	-54.3%	18.2%	142	-24.9%	2.9%	255	31.2%	9.9%	0	-	0.1%	1,924	-48.3%	8.5%
PL	-	-	0.0%	-	0	-450.0%	241	-15.1%	4.9%	35	-15.0%	1.4%	458	1201.1%	67.8%	734	103.5%	3.2%
PT	-	-	0.0%	-	-	0.0%	67	-50.8%	1.4%	-	-	0.0%	12	-56.1%	1.8%	79	-51.7%	0.3%
RO	-	-	0.0%	-	-	0.0%	74	7.5%	1.5%	22	-74.2%	0.9%	2	-35.4%	0.3%	98	-38.2%	0.4%
SE	-	-	0.0%	-	-	0.0%	209	29.9%	4.3%	-	-	0.0%	3	-67.0%	-0.5%	205	36.6%	0.9%
SI	-	-	0.0%	-	-	0.0%	22	-15.3%	0.5%	-	-	0.0%	-	-	0.0%	22	-15.3%	0.1%
SK	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	8	-21.8%	1.2%	8	-21.8%	0.0%
UK	9,468	-31.6%	77.5%	97	-22.1%	4.1%	568	26.6%	11.6%	1,687	-34.9%	65.8%	40	1880.0%	5.9%	11,860	-30.3%	52.1%
EU	12,218	-43.0%		2,399	-39.5%		4,900	-16.4%		2,563	-23.4%		676	421.8%		22,757	-34.5%	

Source: Eurostat (SBS), DCF and own calculations.

Table 31 Employment in Port activities by Member State and sub-sector, persons employed, 2017

Member State	Cargo handling			Warehousing and storage			Construction of water projects			Service activities incidental to water transportation			Total		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	36	195.8%	0.1%	1,056	48.3%	0.3%	328	-21.5%	0.5%	93	29.2%	0.1%	1,513	24.6%	0.3%
BE	1,261	-14.3%	2.0%	2,400	134.2%	0.7%	3,717	46.6%	5.7%	3,842	-21.7%	3.1%	11,220	12.9%	2.0%
BG	531	-17.7%	0.9%	282	31.3%	0.1%	2,781	-42.9%	4.3%	1,087	-24.0%	0.9%	4,681	-34.6%	0.8%
CY	298	-19.6%	0.5%	190	46.4%	0.1%	87	-37.9%	0.1%	324	-21.9%	0.3%	899	-14.8%	0.2%
CZ	-		0.0%	6,371	39.0%	2.0%	-		0.0%	-		0.0%	6,371	39.0%	1.1%
DE	3,361	65.5%	5.4%	88,671	71.8%	27.5%	3,251	22.8%	5.0%	16,914	-6.4%	13.6%	112,198	50.8%	19.5%
DK	191	31.8%	0.3%	1,821	41.9%	0.6%	623	-1.7%	1.0%	2,765	100.9%	2.2%	5,400	57.1%	0.9%
EE	879	-0.2%	1.4%	1,727	27.6%	0.5%	165	33.1%	0.3%	1,390	12.3%	1.1%	4,160	15.7%	0.7%
EL	846	66.4%	1.4%	478	-24.5%	0.1%	1,385	-49.1%	2.1%	12,755	330.2%	10.3%	15,464	126.4%	2.7%
ES	3,562	-14.2%	5.8%	3,885	13.1%	1.2%	11,763	-54.9%	18.1%	18,127	0.0%	14.6%	37,337	-27.9%	6.5%
FI	1,387	-11.5%	2.2%	3,959	-11.9%	1.2%	506	-8.8%	0.8%	1,746	-0.7%	1.4%	7,598	-9.3%	1.3%
FR	12,444	-2.4%	20.1%	36,173	11.8%	11.2%	3,106	-37.6%	4.8%	8,219	-7.0%	6.6%	59,943	1.7%	10.4%
HR	219	-27.7%	0.4%	821	291.4%	0.3%	2,802	-21.2%	4.3%	1,374	-1.6%	1.1%	5,216	-4.6%	0.9%
HU	1,658	35.1%	2.7%	4,033	53.7%	1.3%	2,608	39.8%	4.0%	417	-3.7%	0.3%	8,716	41.7%	1.5%
IE	-		0.0%	1,029	2.2%	0.3%	131	79.5%	0.2%	-		0.0%	1,160	7.5%	0.2%
IT	11,501	-15.0%	18.6%	2,874	1.5%	0.9%	6,531	-31.7%	10.0%	14,299	10.4%	11.5%	35,204	-9.4%	6.1%
LT	993	-2.2%	1.6%	1,904	78.3%	0.6%	609	-45.4%	0.9%	537	-17.9%	0.4%	4,043	4.9%	0.7%
LU	58	-49.3%	0.1%	-		0.0%	-		0.0%	-		0.0%	58	-49.3%	0.0%
LV	2,396	4.4%	3.9%	1,903	63.1%	0.6%	640	-29.0%	1.0%	1,286	713.9%	1.0%	6,225	37.7%	1.1%
MT	-		0.0%	188	-23.3%	0.1%	-		0.0%	270	3.1%	0.2%	458	-9.7%	0.1%
NL	8,776	6.5%	14.2%	10,300	23.1%	3.2%	8,555	36.9%	13.1%	4,511	16.8%	3.6%	32,142	20.3%	5.6%
PL	5,661	-27.5%	9.1%	15,205	84.1%	4.7%	6,445	-32.2%	9.9%	1,927	-20.3%	1.5%	29,238	4.5%	5.1%
PT	149	-11.3%	0.2%	846	31.8%	0.3%	825	-39.9%	1.3%	2,337	0.7%	1.9%	4,157	-7.7%	0.7%
RO	1,568	-1.9%	2.5%	527	7.3%	0.2%	5,253	-56.9%	8.1%	5,021	-9.8%	4.0%	12,369	-37.7%	2.2%
SE	790	-5.3%	1.3%	300	37.6%	0.1%	536	2.9%	0.8%	2,244	-8.0%	1.8%	3,870	-3.6%	0.7%
SI	1,317	16.3%	2.1%	77	-47.0%	0.0%	534	-51.0%	0.8%	282	-0.4%	0.2%	2,210	-16.6%	0.4%
SK	375	62.1%	0.6%	3,125	226.9%	1.0%	84	-71.1%	0.1%	185	640.0%	0.1%	3,769	150.7%	0.7%
UK	1,661	46.5%	2.7%	132,460	146.3%	41.1%	1,903	0.8%	2.9%	22,432	15.1%	18.0%	158,456	107.7%	27.6%
EU	61,915	-3.5%		322,605	75.5%		65,168	-32.0%		124,384	11.6%		574,072	26.1%	

Source: Eurostat (SBS), DCF and own calculations.

Table 32 GVA in Port activities by Member State and sub-sector, € million, 2017

Member State	Cargo handling			Warehousing and storage			Construction of water projects			Service activities incidental to water transportation			Total		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	1	-600.0%	0.0%	178	128.0%	1.2%	1	-92.9%	0.0%	14	69.9%	0.1%	193	101.5%	0.6%
BE	183	-40.7%	4.9%	192	101.3%	1.3%	547	99.3%	17.0%	644	-24.5%	4.9%	1,566	2.3%	4.5%
BG	10	84.2%	0.3%	4	35.7%	0.0%	33	-53.5%	1.0%	21	-47.7%	0.2%	68	-43.0%	0.2%
CY	10	-41.8%	0.3%	12	151.5%	0.1%	5	-48.0%	0.2%	54	3.0%	0.4%	82	-3.7%	0.2%
CZ	-		0.0%	200	-10.8%	1.4%	-		0.0%	-		0.0%	200	-10.8%	0.6%
DE	232	85.7%	6.3%	4,220	96.9%	29.4%	189	61.4%	5.9%	1,947	25.2%	14.8%	6,589	67.2%	19.1%
DK	18	93.2%	0.5%	199	48.6%	1.4%	78	50.5%	2.4%	410	111.6%	3.1%	706	81.3%	2.1%
EE	45	-29.8%	1.2%	72	21.4%	0.5%	6	136.0%	0.2%	132	46.0%	1.0%	255	17.7%	0.7%
EL	41	160.9%	1.1%	13	-27.5%	0.1%	13	-86.1%	0.4%	699	246.6%	5.3%	767	131.8%	2.2%
ES	264	5.2%	7.1%	272	31.2%	1.9%	538	-53.3%	16.7%	1,987	0.0%	15.1%	3,060	-14.9%	8.9%
FI	92	14.4%	2.5%	197	-6.3%	1.4%	30	-23.2%	0.9%	251	20.4%	1.9%	569	6.0%	1.7%
FR	839	23.1%	22.6%	2,191	12.8%	15.2%	71	-94.3%	2.2%	943	29.5%	7.2%	4,044	-12.0%	11.7%
HR	4	-19.9%	0.1%	24	92.0%	0.2%	61	-24.7%	1.9%	43	-12.6%	0.3%	131	-10.7%	0.4%
HU	29	88.5%	0.8%	135	-30.9%	0.9%	9	-66.0%	0.3%	8	13.2%	0.1%	180	-25.8%	0.5%
IE	-		0.0%	78	-1.9%	0.5%	10	142.9%	0.3%	-		0.0%	88	5.4%	0.3%
IT	349	11.0%	9.4%	199	44.5%	1.4%	351	-29.8%	10.9%	1,295	66.0%	9.9%	2,194	26.6%	6.4%
LT	46	40.3%	1.2%	32	59.0%	0.2%	6	-60.5%	0.2%	60	35.3%	0.5%	144	27.6%	0.4%
LU	5	-11.4%	0.1%	-		0.0%	-		0.0%	-		0.0%	5	-11.4%	0.0%
LV	93	10.3%	2.5%	37	92.3%	0.3%	13	-34.8%	0.4%	81	1781.4%	0.6%	224	75.3%	0.7%
MT	-		0.0%	15	0.0%	0.1%	-		0.0%	20	-11.8%	0.1%	34	-7.0%	0.1%
NL	931	15.7%	25.0%	1,242	32.1%	8.6%	850	3.6%	26.4%	1,043	40.6%	7.9%	4,066	22.9%	11.8%
PL	170	5.3%	4.6%	318	172.3%	2.2%	98	-52.2%	3.1%	65	-18.4%	0.5%	651	15.5%	1.9%
PT	12	4.2%	0.3%	46	11.8%	0.3%	39	-48.9%	1.2%	246	35.8%	1.9%	343	10.6%	1.0%
RO	33	31.3%	0.9%	10	25.4%	0.1%	48	-70.5%	1.5%	165	39.0%	1.3%	256	-18.8%	0.7%
SE	62	27.0%	1.7%	21	73.9%	0.1%	36	47.9%	1.1%	234	50.6%	1.8%	353	46.7%	1.0%
SI	101	52.4%	2.7%	2	-9.0%	0.0%	17	-46.3%	0.5%	15	65.2%	0.1%	135	23.6%	0.4%
SK	11	195.9%	0.3%	53	-318.7%	0.4%	1	-80.9%	0.0%	4	147.1%	0.0%	70	-675.2%	0.2%
UK	137	44.6%	3.7%	4,414	84.4%	30.7%	175	-49.1%	5.4%	2,740	12.8%	20.9%	7,466	41.9%	21.7%
EU	3,719	15.0%		14,375	58.2%		3,225	-40.1%		13,121	24.5%		34,440	21.9%	

Source: Eurostat (SBS), DCF and own calculations.

Table 33 Employment in Shipbuilding and repair by Member State and sub-sector, persons employed, 2017

Member State	Building of pleasure and sporting boats			Building of ships and floating structures			Marine equipment			Marine machinery			Repair and maintenance of ships and boats			Total		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	264	20.0%	0.5%	-	-	0.0%	379	-8.1%	1.9%	507	60.4%	2.1%	182	2.8%	0.2%	1,332	18.3%	0.4%
BE	15	-42.3%	0.0%	110	-0.9%	0.1%	92	939.1%	0.5%	126	-88.5%	0.5%	1,020	-40.3%	1.0%	1,363	-53.7%	0.4%
BG	33	-43.1%	0.1%	616	-75.6%	0.5%	190	69.6%	1.0%	14	-71.7%	0.1%	4,545	8.7%	4.5%	5,399	-22.1%	1.7%
CY	26	-10.3%	0.1%	-	-	0.0%	-	-	0.0%	-	-	0.0%	1,148	1003.8%	1.1%	1,174	782.7%	0.4%
CZ	80	3.9%	0.2%	226	3.2%	0.2%	1,187	65.8%	6.0%	782	159.0%	3.3%	45	-10.0%	0.0%	2,320	70.1%	0.7%
DE	7,572	102.1%	14.9%	12,597	-17.6%	10.6%	3,041	3342.8%	15.4%	11,255	2.3%	47.4%	5,887	-14.3%	5.8%	40,352	9.1%	12.8%
DK	246	9.3%	0.5%	915	-60.2%	0.8%	158	9.9%	0.8%	124	-70.9%	0.5%	1,712	28.4%	1.7%	3,155	-28.7%	1.0%
EE	340	12.2%	0.7%	426	38.3%	0.4%	522	7.7%	2.6%	11	2306.4%	0.0%	1,695	41.4%	1.7%	2,994	30.5%	1.0%
EL	228	10.1%	0.4%	1,502	-63.4%	1.3%	373	14.4%	1.9%	9	39.8%	0.0%	6,335	30.7%	6.2%	8,447	-11.0%	2.7%
ES	580	-54.8%	1.1%	9,202	-27.3%	7.7%	1,313	202.4%	6.6%	660	0.9%	2.8%	11,755	-8.3%	11.6%	23,510	-15.6%	7.5%
FI	1,900	-22.2%	3.7%	3,628	-34.2%	3.0%	621	-17.3%	3.1%	800	-50.9%	3.4%	863	9.1%	0.8%	7,812	-29.8%	2.5%
FR	7,201	-4.1%	14.2%	14,821	17.9%	12.4%	1,777	109.0%	9.0%	2,139	-35.5%	9.0%	6,765	3.3%	6.7%	32,703	6.2%	10.4%
HR	321	-50.4%	0.6%	5,633	-54.5%	4.7%	238	176.8%	1.2%	111	-90.9%	0.5%	3,446	2.9%	3.4%	9,749	-44.9%	3.1%
HU	192	-12.7%	0.4%	123	70.8%	0.1%	601	1953.2%	3.0%	2,703	526.1%	11.4%	98	-17.6%	0.1%	3,717	326.3%	1.2%
IE	44	-13.7%	0.1%	68	-38.7%	0.1%	235	-6.2%	1.2%	159	11.1%	0.7%	275	20.6%	0.3%	781	-0.3%	0.2%
IT	7,215	-42.9%	14.2%	16,754	-13.8%	14.1%	936	-26.8%	4.7%	1,171	-40.7%	4.9%	9,133	-11.3%	9.0%	35,209	-22.8%	11.2%
LT	262	57.8%	0.5%	1,176	-31.1%	1.0%	453	-23.1%	2.3%	76	50.5%	0.3%	2,798	-19.2%	2.8%	4,765	-20.3%	1.5%
LU	-	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
LV	386	219.0%	0.8%	701	-16.7%	0.6%	216	912.2%	1.1%	58	117.7%	0.2%	1,279	-23.3%	1.3%	2,640	-1.5%	0.8%
MT	20	0.0%	0.0%	-	-	0.0%	-	0.0%	0.0%	-	-	0.0%	353	30.3%	0.3%	373	28.2%	0.1%
NL	5,283	-2.8%	10.4%	6,000	-7.5%	5.0%	183	-43.4%	0.9%	157	-62.7%	0.7%	6,215	28.5%	6.1%	17,838	1.9%	5.7%
PL	5,723	44.6%	11.3%	4,902	-65.6%	4.1%	1,841	350.4%	9.3%	90	-90.3%	0.4%	10,705	10.2%	10.5%	23,261	-20.5%	7.4%
PT	617	50.5%	1.2%	881	-60.5%	0.7%	314	-18.3%	1.6%	88	-30.6%	0.4%	1,576	-7.2%	1.5%	3,476	-28.3%	1.1%
RO	233	-12.7%	0.5%	15,803	-28.2%	13.3%	18	-52.1%	0.1%	271	-55.1%	1.1%	8,307	5.1%	8.2%	24,632	-20.1%	7.8%
SE	1,273	-40.4%	2.5%	1,457	-11.5%	1.2%	700	798.0%	3.5%	805	-2.6%	3.4%	1,923	2.8%	1.9%	6,158	-6.1%	2.0%
SI	163	-64.8%	0.3%	24	-48.9%	0.0%	100	151.4%	0.5%	353	152.1%	1.5%	237	86.6%	0.2%	877	7.4%	0.3%
SK	65	209.5%	0.1%	41	-91.3%	0.0%	391	49.3%	2.0%	2	-42.9%	0.0%	73	-3.9%	0.1%	572	-31.3%	0.2%
UK	10,521	6.8%	20.7%	21,542	-25.5%	18.1%	3,877	327.2%	19.6%	1,253	-29.7%	5.3%	13,349	239.1%	13.1%	50,542	11.3%	16.0%
EU	50,803	-3.3%		119,148	-28.3%		19,758	119.0%		23,722	-13.6%		101,719	12.8%		315,150	-8.8%	

Source: Eurostat (SBS), DCF and own calculations.

Table 34 GVA in Shipbuilding and repair by Member State and sub-sector, € million, 2017

Member State	Building of pleasure and sporting boats			Building of ships and floating structures			Marine equipment			Marine machinery			Repair and maintenance of ships and boats			Total		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	19	175.0%	0.8%	-	-	0.0%	24	36.2%	3.4%	37	144.5%	2.0%	13	42.4%	0.4%	93	90.3%	0.6%
BE	0	-87.5%	0.0%	7	6.1%	0.1%	5	1240.9%	0.6%	18	-84.4%	1.0%	67	-29.2%	2.0%	97	-55.9%	0.7%
BG	-	0.0%	0.0%	8	-48.6%	0.1%	2	197.6%	0.3%	0	-21.0%	0.0%	65	35.7%	2.0%	75	18.0%	0.5%
CY	1	60.0%	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	43	804.3%	1.3%	43	732.7%	0.3%
CZ	1	9.1%	0.1%	3	23.8%	0.0%	17	88.6%	2.4%	30	112.8%	1.6%	0	-33.3%	0.0%	51	90.1%	0.3%
DE	479	86.4%	20.0%	1,037	32.5%	15.8%	149	3964.2%	21.1%	1,014	55.6%	54.3%	307	-27.5%	9.3%	2,986	40.9%	20.1%
DK	17	5.6%	0.7%	89	-28.4%	1.4%	11	51.7%	1.6%	15	-68.8%	0.8%	148	60.5%	4.5%	279	-2.5%	1.9%
EE	9	62.5%	0.4%	15	94.9%	0.2%	9	6.2%	1.3%	0	4157.5%	0.0%	37	54.1%	1.1%	71	53.9%	0.5%
EL	4	5.6%	0.2%	34	-87.7%	0.5%	8	-25.2%	1.2%	0	-56.9%	0.0%	140	-8.5%	4.2%	186	-57.8%	1.3%
ES	18	-75.1%	0.7%	290	-51.7%	4.4%	38	182.3%	5.4%	41	-8.8%	2.2%	482	-3.4%	14.6%	869	-29.3%	5.9%
FI	95	50.2%	4.0%	211	-4.0%	3.2%	27	-5.0%	3.8%	61	-68.8%	3.3%	44	34.0%	1.3%	438	-18.8%	3.0%
FR	424	64.2%	17.7%	1,110	83.2%	17.0%	89	114.9%	12.6%	204	-21.8%	10.9%	291	-0.3%	8.8%	2,118	45.2%	14.3%
HR	1	-80.6%	0.1%	22	-88.2%	0.3%	3	262.3%	0.5%	2	-90.5%	0.1%	66	14.4%	2.0%	95	-65.8%	0.6%
HU	2	-10.0%	0.1%	2	275.0%	0.0%	4	1074.4%	0.5%	66	524.7%	3.5%	1	-12.5%	0.0%	73	422.8%	0.5%
IE	2	-4.0%	0.1%	4	-30.8%	0.1%	11	10.1%	1.5%	17	-15.2%	0.9%	20	78.4%	0.6%	54	10.0%	0.4%
IT	456	-0.3%	19.0%	1,110	26.9%	16.9%	49	2.5%	7.0%	107	-37.8%	5.7%	363	7.6%	11.0%	2,085	10.3%	14.1%
LT	4	272.7%	0.2%	25	-26.3%	0.4%	8	18.1%	1.1%	2	203.6%	0.1%	57	60.8%	1.7%	96	24.1%	0.6%
LU	-	0.0%	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
LV	3	44.4%	0.1%	12	19.8%	0.2%	2	1493.5%	0.3%	1	52.6%	0.1%	15	-16.8%	0.5%	33	7.3%	0.2%
MT	-	0.0%	0.0%	-	-100.0%	0.0%	-	-	0.0%	-	-	0.0%	9	-25.8%	0.3%	9	-27.6%	0.1%
NL	365	-7.1%	15.2%	365	-7.1%	5.6%	-	-	0.0%	-	-	0.0%	-	-	0.0%	731	-7.1%	4.9%
PL	115	103.4%	4.8%	150	-65.7%	2.3%	24	387.3%	3.4%	2	-93.1%	0.1%	257	43.2%	7.8%	548	-23.0%	3.7%
PT	22	447.5%	0.9%	27	-22.5%	0.4%	9	21.5%	1.3%	9	52.8%	0.5%	56	-17.9%	1.7%	123	2.0%	0.8%
RO	3	68.8%	0.1%	230	6.0%	3.5%	0	-35.1%	0.0%	6	-26.9%	0.3%	83	31.6%	2.5%	321	11.0%	2.2%
SE	54	-22.9%	2.2%	108	92.5%	1.6%	35	960.4%	5.0%	93	71.0%	5.0%	103	24.8%	3.1%	393	47.7%	2.7%
SI	7	43.5%	0.3%	0	-42.9%	0.0%	3	309.3%	0.4%	24	257.1%	1.3%	5	226.7%	0.1%	39	172.5%	0.3%
SK	-	-166.7%	0.0%	1	-64.7%	0.0%	6	105.1%	0.8%	0	-2.6%	0.0%	1	9.1%	0.0%	7	23.2%	0.0%
UK	300	-21.8%	12.5%	1,689	65.6%	25.8%	172	447.1%	24.4%	117	-36.2%	6.3%	629	270.2%	19.1%	2,908	62.6%	19.6%
EU	2,400	15.9%		6,546	10.8%		704	173.2%		1,868	0.0%		3,302	21.8%		14,821	15.6%	

Source: Eurostat (SBS), DCF and own calculations.

Table 35 Employment in Maritime transport by Member State and sub-sector, persons employed, 2017

Member State	Sea and coastal passenger water transport			Sea and coastal freight water transport			Inland passenger water transport			Inland freight water transport			Renting and leasing of water transport equipment			Total		
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share
AT	-	-	0.0%	-	-	0.0%	451	21.6%	2.1%	81	-50.3%	0.4%	29	45.0%	0.2%	561	1.3%	0.2%
BE	269	0.0%	0.3%	912	283.2%	1.1%	199	7.6%	0.9%	702	82.3%	3.2%	123	57.7%	1.0%	2,205	90.9%	0.9%
BG	169	111.3%	0.2%	522	-8.3%	0.6%	329	-	1.5%	613	-44.0%	2.8%	48	77.8%	0.4%	1,681	-5.1%	0.7%
CY	243	-91.0%	0.3%	67	0.0%	0.1%	-	0.0%	-	-	-	0.0%	-	-	0.0%	310	-88.8%	0.1%
CZ	-	-	0.0%	-	-	0.0%	272	0.0%	1.3%	285	-21.3%	1.3%	-	-	0.0%	557	-12.1%	0.2%
DE	3,466	116.1%	3.8%	17,869	-33.3%	21.0%	5,787	30.2%	27.1%	4,665	14.3%	21.0%	2,116	2.2%	16.9%	33,903	-13.1%	14.6%
DK	5,194	17.5%	5.7%	14,000	-2.0%	16.5%	144	-7.1%	0.7%	22	-20.0%	0.1%	54	14.9%	0.4%	19,414	2.5%	8.4%
EE	766	-9.2%	0.8%	-	-	0.0%	-	-	0.0%	-	-	0.0%	40	0.0%	0.3%	806	-8.8%	0.3%
EL	8,360	-29.0%	9.2%	7,553	50.4%	8.9%	-	-	0.0%	-	-	0.0%	1,800	-36.2%	14.4%	17,713	-9.7%	7.6%
ES	3,546	-21.7%	3.9%	3,234	13.9%	3.8%	451	15.1%	2.1%	67	36.7%	0.3%	2,734	0.0%	21.8%	10,032	-4.9%	4.3%
FI	5,809	3.0%	6.4%	2,850	-24.9%	3.4%	211	-9.8%	1.0%	47	23.7%	0.2%	15	42.9%	0.1%	8,932	-8.1%	3.8%
FR	5,097	-7.5%	5.6%	5,949	-32.7%	7.0%	2,518	23.9%	11.8%	1,434	-14.5%	6.5%	226	242.4%	1.8%	15,224	-16.0%	6.6%
HR	3,390	7.6%	3.7%	743	-1.3%	0.9%	19	0.1%	0.1%	35	-77.6%	0.2%	2,457	18.6%	19.6%	6,644	8.3%	2.9%
HU	3	-78.6%	0.0%	8	-86.7%	0.0%	663	15.5%	3.1%	121	-59.3%	0.5%	84	-24.3%	0.7%	879	-16.8%	0.4%
IE	318	-40.8%	0.3%	323	7.3%	0.4%	91	51.7%	0.4%	-	-	0.0%	-	-	0.0%	732	-18.5%	0.3%
IT	36,665	117.8%	40.2%	9,696	-18.3%	11.4%	2,328	-8.0%	10.9%	614	10.0%	2.8%	632	-76.6%	5.0%	49,935	44.8%	21.5%
LT	-	-	0.0%	1,102	-31.2%	1.3%	130	-9.1%	0.6%	-	-	0.0%	79	146.9%	0.6%	1,311	-26.2%	0.6%
LU	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%
LV	425	-17.3%	0.5%	191	-58.0%	0.2%	39	290.0%	0.2%	147	568.2%	0.7%	90	260.0%	0.7%	892	-13.1%	0.4%
MT	-	-	0.0%	104	20.9%	0.1%	-	-100.0%	0.0%	-	-	0.0%	43	-37.7%	0.3%	147	-7.0%	0.1%
NL	1,696	-0.9%	1.9%	6,972	-29.6%	8.2%	3,300	4.6%	15.4%	10,118	-4.1%	45.6%	435	139.0%	3.5%	22,521	-11.7%	9.7%
PL	633	69.5%	0.7%	1,465	-21.1%	1.7%	545	-22.0%	2.6%	894	23.7%	4.0%	246	96.8%	2.0%	3,783	0.1%	1.6%
PT	407	0.0%	0.4%	480	-22.1%	0.6%	242	0.0%	1.1%	-	-	0.0%	143	41.6%	1.1%	1,272	-6.9%	0.5%
RO	31	416.7%	0.0%	263	-67.4%	0.3%	322	-9.0%	1.5%	1,706	-20.0%	7.7%	141	48.4%	1.1%	2,463	-27.5%	1.1%
SE	8,403	-13.1%	9.2%	3,616	-46.2%	4.3%	1,371	39.5%	6.4%	111	-31.1%	0.5%	93	55.0%	0.7%	13,594	-22.7%	5.9%
SI	40	-13.0%	0.0%	142	-27.2%	0.2%	38	0.0%	0.2%	-	-	0.0%	48	37.1%	0.4%	268	-14.6%	0.1%
SK	4	-	0.0%	-	-	0.0%	112	160.5%	0.5%	266	-53.6%	1.2%	5	-72.2%	0.0%	387	-39.0%	0.2%
UK	6,301	-29.9%	6.9%	6,855	24.6%	8.1%	1,810	37.1%	8.5%	263	-22.4%	1.2%	846	-22.0%	6.8%	16,075	-6.7%	6.9%
EU	91,235	14.6%		84,916	-17.7%		21,372	17.2%		22,191	-5.2%		12,527	-14.4%		232,241	-2.9%	

Source: Eurostat (SBS), DCF and own calculations.

Table 36 GVA in Maritime transport by Member State and sub-sector, € million, 2017

Member State	Sea and coastal passenger water transport			Sea and coastal freight water transport			Inland passenger water transport			Inland freight water transport			Renting and leasing of water transport equipment			Total			
	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	2017	2009-17	EU share	
AT	-	-	0.0%	-	-	0.0%	29	96.0%	3.6%	-	2	-124.0%	-0.3%	13	1.6%	0.8%	40	7.0%	0.2%
BE	57	0.0%	0.7%	805	443.0%	7.3%	18	-1.1%	2.1%	68	66.7%	8.7%	161	573.2%	10.3%	1,109	285.2%	5.1%	
BG	2	750.0%	0.0%	14	-31.1%	0.1%	6	-	0.7%	9	-31.6%	1.2%	1	62.5%	0.1%	32	-6.8%	0.1%	
CY	6	-94.1%	0.1%	-	0.0%	-0.1%	-	-	0.0%	-	-	0.0%	-	-	0.0%	0	-99.7%	0.0%	
CZ	-	-	0.0%	-	-	0.0%	3	0.0%	0.4%	5	8.9%	0.6%	-	-	0.0%	8	5.1%	0.0%	
DE	1,262	477.7%	16.3%	2,241	-67.6%	20.3%	284	52.9%	34.5%	472	-27.4%	61.0%	265	-69.6%	17.0%	4,524	-48.9%	20.6%	
DK	766	85.3%	9.9%	1,982	11.6%	17.9%	14	333.3%	1.7%	2	-33.3%	0.2%	41	59.6%	2.6%	2,805	26.3%	12.8%	
EE	22	49.3%	0.3%	-	-	0.0%	-	-	0.0%	-	-	0.0%	12	0.0%	0.7%	34	27.8%	0.2%	
EL	479	-34.8%	6.2%	519	110.5%	4.7%	-	-	0.0%	-	-	0.0%	27	-21.3%	1.7%	1,025	1.0%	4.7%	
ES	264	2.1%	3.4%	376	55.6%	3.4%	14	6.2%	1.7%	2	20.0%	0.2%	173	0.0%	11.1%	828	20.5%	3.8%	
FI	321	16.7%	4.1%	379	29.7%	3.4%	5	-29.7%	0.5%	3	58.8%	0.3%	2	214.3%	0.1%	710	23.2%	3.2%	
FR	416	74.0%	5.4%	-	-	0.0%	136	24.0%	16.5%	95	-3.5%	12.3%	458	0.3%	29.3%	962	34.1%	4.4%	
HR	60	-18.0%	0.8%	55	-24.1%	0.5%	0	-	0.0%	0	-84.0%	0.1%	59	14.3%	3.8%	175	-12.6%	0.8%	
HU	-	-100.0%	0.0%	0	-88.2%	0.0%	10	52.3%	1.2%	2	2200.0%	0.3%	7	762.5%	0.4%	19	109.8%	0.1%	
IE	142	38.8%	1.8%	69	230.1%	0.6%	6	-13.0%	0.7%	-	-	0.0%	-	-	0.0%	217	66.8%	1.0%	
IT	2,237	21.6%	28.9%	1,425	93.8%	12.9%	114	25.3%	13.9%	23	35.7%	2.9%	107	141.8%	6.9%	3,906	43.3%	17.8%	
LT	-	-	0.0%	30	-44.0%	0.3%	3	-2.9%	0.4%	-	-	0.0%	4	760.0%	0.3%	37	-34.5%	0.2%	
LU	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	
LV	-	-	0.0%	10	-47.5%	0.1%	0	-66.7%	0.0%	6	2700.0%	0.7%	3	17.4%	0.2%	18	-14.7%	0.1%	
MT	-	-	0.0%	-	-	0.0%	-	-	0.0%	-	-	0.0%	30	1647.1%	1.9%	30	1647.1%	0.1%	
NL	-	-	0.0%	1,350	3.9%	12.2%	-	-	0.0%	-	-	0.0%	-	-	0.0%	1,350	3.9%	6.2%	
PL	20	35.4%	0.3%	127	45.0%	1.2%	7	-73.7%	0.9%	21	-36.2%	2.7%	1	-91.3%	0.1%	175	2.0%	0.8%	
PT	6	0.0%	0.1%	56	11.8%	0.5%	5	0.0%	0.7%	-	-	0.0%	2	64.3%	0.1%	69	10.9%	0.3%	
RO	0	-25.0%	0.0%	12	-26.3%	0.1%	7	103.1%	0.8%	32	-24.8%	4.1%	-	-	0.0%	51	-18.7%	0.2%	
SE	383	21.5%	5.0%	309	43.0%	2.8%	70	325.6%	8.5%	7	80.0%	0.9%	36	-48.4%	2.3%	806	29.5%	3.7%	
SI	1	-37.5%	0.0%	10	1.0%	0.1%	2	220.0%	0.2%	0	0.0%	0.0%	2	1050.0%	0.1%	15	25.2%	0.1%	
SK	-	-	0.0%	-	-	0.0%	2	20.0%	0.3%	12	18.2%	1.5%	-	-100.0%	0.0%	14	11.0%	0.1%	
UK	1,301	30.8%	16.8%	1,420	-2.9%	12.9%	88	278.0%	10.7%	19	16.7%	2.4%	156	49.9%	10.0%	2,984	14.7%	13.6%	
EU	7,745	36.8%		11,042	-18.2%		822	52.4%		775	-18.2%		1,560	-17.9%		21,944	-2.7%		

Source: Eurostat (SBS), DCF and own calculations.

ANNEX II:
**METHODOLOGICAL
FRAMEWORK**

Sources and timeframe

The analysis of the established Blue Economy sectors is based on the standardised data provided by the Structural Business Statistics (SBS) compiled by Eurostat. The SBS were complemented by the EU Data Collection Framework (DCF)¹⁵³ for the primary sectors (capture fisheries and aquaculture). Given the time lag in the release of SBS and DCF data, the latest available year is 2017, which is used as the reference year for the current report. The baseline year is 2009.

Identification of sectors

SBS data are based on enterprise data grouped under the declared main activity of each enterprise, according to the statistical classification of economic activities in the European Community (NACE Rev.2). Out of the 615 classes of activities singled out through a four-digit NACE code, 50 classes have been identified that have a principal or significant maritime component. They have been classified into sectors and subsectors (Table 37).

Coastal tourism requires a specific treatment. It is not a single economic activity but rather a set of activities undertaken by a specific type of consumer (the tourist). Coastal tourism happens when a visitor takes a trip to a coastal municipality¹⁵⁴ and spends at least one night in the destination. It is considered to be part of this category the expenditures in accommodation, transport and other expenditures by tourists (cultural and recreation good, goods in specialised stores and food and beverage services). To calculate the contribution of coastal tourism to the Blue Economy, a specific methodology is followed combining data from SBS and tourism statistics. See further details under “Data imputations and assumptions” below.

While certain economic activities can be clearly identified as fully marine (for example, shipping and Maritime transport), for other sectors, the NACE classification includes both land and maritime activities (e.g. cargo handling, warehousing and extraction of oil and gas). In this later case, alternative sources are used for the estimation of the maritime proportion (see below). Five activities (G 47.11, E 38.31, E 36.00, K 65.12, K 65.20, see Table 38) have been identified as having an important maritime component, but have no reliable source available to estimate the actual maritime proportion. Therefore, these activities were not included in this year's report.

Aside from their main activity, enterprises may have one or more secondary activities. Unfortunately, detailed information is unavailable

about the economic importance of secondary activities. Therefore, the overall activity for each firm was assigned to its main activity.

Details on the calculation of the maritime proportion

For the specific calculation of the maritime proportion, the use of alternative national sources or some general assumptions were made in the following sectors: extraction of oil and gas and supporting activities¹⁵⁵, cargo handling, warehousing and storage, and other transportation support activities.

For Marine equipment and machinery, PRODCOM data were used to estimate the maritime proportion in the following way: within the NACE class, products corresponding to it were identified and their production value share calculated over the total production of the class. A similar approach was followed for Prepared and other food products. The list of PRODCOM items identified as maritime for the calculation of the maritime proportions is detailed in Table 39.

For coastal tourism the maritime proportion was calculated as the share of tourist nights spent in coastal municipalities compared to the total tourist nights in each Member State (see “Data imputation and assumptions for further details”).

Indicators and variables

SBS statistics provide a series of variables usually derived from the financial statements of the companies. For the analysis of the established sectors, we have used the following selection of variables and indicators: employment (number of persons employed), wages and salaries, turnover, gross value added, gross operating surplus (profit or loss) and gross investments and net investments. In addition, we calculated the following derived indicators: average annual wage per persons employed, GVA to turnover, profit margin (gross operating surplus to turnover), labour productivity (GVA per person employed) and net investment ratio (net investment to GVA). More details about the indicators and variables are explained in the glossary.

153. 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.

154. Coastal municipalities are those with a coastline or with 50 % of its territory within 10 km of the sea. Certain major cities are treated differently, e.g. Rome and Amsterdam.

155. Data were obtained from the European Union Offshore Oil and Gas Authorities Group (EUOAG).

Table 37 Established Blue Economy sectors: classification

Sector	Sub-sector	NACE Code	Description	Maritime proportion
Marine living resources	Primary production	A 03.10	Capture fisheries (EU fishing fleet, data from DCF)	100
		A 03.20	Aquaculture sector (onshore and offshore production, data from DCF)	100
	Processing and distribution	C 10.20	Processing and preserving of fish, crustaceans and molluscs	100
		C 10.41	Manufacture of oils and fats	PRODCOM (10411200)
		C 10.85	Prepared meals and dishes	PRODCOM (10851200, 10851410)
		C 10.89	Other food product	PRODCOM (10891400)
		G 46.38	Wholesale of other food, including fish, crustaceans and molluscs	100
		G 47.23	Retail sale of fish, crustaceans and molluscs in specialised stores	100
Marine non-living resources	Oil and gas	B 06.10	Extraction of crude petroleum	MS Sources
		B 06.20	Extraction of natural gas	MS Sources
		B 09.10	Support activities for petroleum and natural gas extraction	MS Sources
	Other minerals	B 08.12	Operation of gravel and sand pits; mining of clays and Kaolin	100
		B 09.90	Support activities for other mining and quarrying	SBS (Weight of B 08.12 in B05, B07 and B08)
Port activities	Ports	H 52.22	Service activities incidental to water transportation	100
		H 52.24	Cargo handling (port services)	50% (or country specific information)
		H 52.10	Warehousing and storage	50% (or country specific information)
	Construction of water projects	F 42.91	Construction of water projects.	100
Shipbuilding and repair	Shipbuilding	C 30.11	Building of ships and floating structures	100
		C 30.12	Building of pleasure and sporting boats	100
		C 33.15	Repair and maintenance of ships and boats	100
	Marine equipment and machinery	C 13.92	Manufacture of made-up textile articles, except apparel	PRODCOM (13922250, 13922999)
		C 13.94	Manufacture of cordage, rope, twine and netting	PRODCOM (13941233, 13941235)
		C 26.51	Manufacture of instruments and appliances for measuring, testing and navigation	PRODCOM (26511180, 26512080)
		C 28.11	Manufacture of engines and turbines, except motor vehicle, aircraft and cycle propulsion	PRODCOM (28111100, 28111200, 28111311, 28111315, 28111319, 28112200)
		C 32.30	Manufacture of sport goods	PRODCOM (32301300, 32301600)
Maritime Transport	Shipping and transport	H 50.10	Sea and coastal passenger water transport (water transport)	100
		H 50.20	Sea and coastal freight water transport (water transport)	100
		H 50.30	Inland passenger water transport	100
		H 50.40	Inland freight water transport	100
		N 77.34	Renting and leasing of water transport equipment	100
		H 52.29	Other transportation support activities	50% (or country specific information)
Coastal tourism	Accommodation	I 55.10	Hotels and similar accommodation	Share of tourist nights spent on coastal municipalities over MS total
		I 55.20	Holidays and other short-stay accommodation	
		I 55.30	Camping grounds, recreational vehicle parks and trailer parks	
		I 55.90	Other accommodation	
	Transport	G 47.30	Retail sale of automotive fuel in specialised stores	
		H 49.10	Passenger rail transport, interurban	
		H 49.30	Urban and suburban passenger land transport	
		H 50.10	Sea and coastal passenger water transport	
		H 51.10	Passenger air transport	
	Other expenditures	G 47.60	Retail sale of cultural and recreation goods in specialised stores	
		G 47.70	Retail sale of other goods in specialised stores	
		I 56.00	Food and beverage service activities	

Source: Eurostat and own elaboration.

Table 38 Sectors for which further information is needed before they can be taken into account

Sector	Sub-sector	NACE Code	Description
Living resources	Processing and distribution	G 47.11	Retail in non-specialised stores with food, beverages or tobacco predominating
Extraction of non-living resources	Other minerals	B 08.93	Extraction of salt
Shipbuilding, repair and dismantling	Shipbuilding	E 38.31	Dismantling of wrecks
Water treatment	Desalinisation	E 36.00	Water collection, treatment and supply
Insurance	Insurance	K 65.12	Non life insurance
		K 65.20	Reinsurance

Source: Eurostat and own elaboration.

Table 39 PRODCOM items considered maritime within each NACE class

NACE Class	NACE Description	PRODCOM Code	PRODCOM Description
C 10.41	Manufacture of oils and fats		
		10.41.12.00	Fats and oils and their fractions of fish or marine mammals
C 10.85	Prepared meals and dishes		
		10.85.12.00	Prepared meals and dishes based on fish, crustaceans and molluscs
		10.85.14.10	Cooked or uncooked pasta stuffed with meat, fish, cheese or other substances in any proportion
C 10.89	Other food product		
		10.89.14.00	Extracts and juices of meat, fish, crustaceans, molluscs or other aquatic invertebrates
C 13.92	Manufacture of made-up textile articles, except apparel		
		13.92.22.50	Sails
		13.92.29.99	Life-jackets
C 13.94	Manufacture of cordage, rope, twine and netting		
		13.94.12.33	Made-up fishing nets from twine, cordage or rope of man-made fibres
		13.94.12.35	Made-up fishing nets from yarn of man-made fibres
C 26.51	Manufacture of instruments and appliances for measuring, testing and navigation		
		26.51.11.80	Manufacture of instruments and appliances for navigation (including for marine or river navigation)
		26.51.20.80	Radio remote control apparatus (including for ships)
C 28.11	Manufacture of engines and turbines, except motor vehicle, aircraft and cycle propulsion		
		28.11.11.00	Outboard motors for marine propulsion
		28.11.12.00	Spark ignition reciprocating or rotary internal combustion piston engines for marine propulsion (excluding outboard motors) and for other use (excluding aircraft engines and engines for vehicles of CN chapter 87)
		28.11.13.11	Marine propulsion compression-ignition internal combustion piston engines (diesel or semi-diesel) of a power ≤ 200 kW
		28.11.13.15	Marine propulsion compression-ignition internal combustion piston engines (diesel or semi-diesel) of a power > 200 kW but ≤ 1 000 kW
		28.11.13.19	Marine propulsion compression-ignition internal combustion piston engines (diesel or semi-diesel) of a power > 1 000 kW
		28.11.22.00	Hydraulic turbines and water wheels
C 32.30	Manufacture of sport goods		
		32.30.13.00	Water-skis, surfboards, sailboards and other water-sport equipment
		32.30.16.00	Fishing rods, other line fishing tackle; articles for hunting or fishing n.e.c.

Source: Eurostat and own elaboration.

Data imputation and assumptions

The goal is to obtain a balance panel; therefore, a series of assumptions were made when confronted with missing values. For this, three main rules were applied:

- Imputations are based on other data from the same Member State (i.e. no estimations based on data for other Member States).
- Interpolation or the closest value over the time series of a NACE class (4-digit code) was used to impute missing values.
- When no data were available for a NACE class (4-digit code), the data for the parent NACE group (3-digit code) were evenly distributed among the classes in the group.

For the **Coastal Tourism** sector, we followed a specific approach:

The data for accommodation, transport and other expenditures cannot be separated into tourism and non-tourism activities. In order to derive such estimates additional steps were required, combining the SBS data with specific statistics and surveys on tourism. For example, to calculate the number of persons employed in transport related to coastal tourism, the process applied was as follows:

- Calculate E , the expenditure on tourism transport from surveys on tourist spending.
- Calculate R , the ratio of persons employed to turnover in all transport activities (tourist and non-tourist).

The number of persons employed in tourist transport was estimated as $E \times R$.

Expenditures on tourist transport (E^{tran}) and accommodation (E^{acc}) are obtained from the Eurostat tables *tour_dem_extrw* and *tour_dem_exacw*, respectively. Expenditures on "other" categories (E^{other}), such as restaurants or purchases of goods are calculated by subtracting transport and accommodation expenditures from the total (table *tour_dem_exptot*):

$$E^{other} = E^{tot} - E^{tran} - E^{acc}$$

Data in the table *tour_dem_exp* do not include visitors from non-EU countries. To incorporate this contribution, the table *tour_occ_ninraw* is used to calculate the number of nights spent by EU residents (N_{EU}) and by visitors from all around the world (N_{world}):

$$E_{world}^i = E^i \frac{N_{world}}{N_{EU}}$$

where $i = \{acc, tran, other\}$

Subsequently, SBS data were used to calculate the

ratio R_{SBS} of the indicator I_{SBS} to turnover T_{SBS} :

$$R_{SBS}^i = \frac{I_{SBS}^i}{T_{SBS}^i}$$

For example, for persons employed in tourist transport, the ratio is calculated by dividing the total number of persons employed by the total turnover in all kinds of tourist activities (e.g., air, road, and rail). The indicator value is then estimated as:

$$I^i = \frac{E_{world}^i}{R_{SBS}^i}$$

Finally, the indicator is further adjusted to take into account the maritime proportion. This is achieved by using data in *tour_occ_ninatc* to calculate the fraction of coastal tourism (F_{coast}) as the number of nights spent in coastal areas (N_{coast}) over total nights (N_{tot}):

$$F_{coast} = \frac{N_{coast}}{N_{tot}}$$

$$I_{coast}^i = I^i \cdot F_{coast}$$

For coastal areas, we understand the municipalities with a coastline or with at least 50 % of their surface area within a distance of 10 km from the coastline. The classification of regions has been established by the TERCET Regulation: Regulation (EU) 2017/2391 of the European Parliament and of the Council of 12 December 2017 amending Regulation (EC) No 1059/2003 as regards the territorial typologies.

Breaks in the series

We have detected some breaks in some data series (e.g., the statistics on tourism for Sweden and Denmark significantly changed their methodology between 2016 and 2017). In order to avoid biases in the interpretation of the overall EU data, we have corrected those series as if the methodology would not have changed. No correction was made for other breaks as we considered that the impact of those breaks on the overall estimates for the EU or at Member States level was not material.

DATA SOURCES

The list of tables extracted from the Eurostat (and from the DCF) to make the estimations of economic indicators for the established sectors of the EU Blue Economy is summarised in Table 40.

Table 40 Main data sources for the Established Sectors of the EU Blue Economy

Table	Source	Description
DCF_fleet_aquaculture_for_BE	JRC	Fisheries and aquaculture economic statistics.
sbs_na_1a_se_r2	Eurostat	Annual detailed enterprise statistics for services (NACE Rev. 2 H-N and S95).
sbs_na_con_r2	Eurostat	Annual detailed enterprise statistics for construction (NACE Rev. 2, F).
sbs_na_dt_r2	Eurostat	Annual detailed enterprise statistics for trade (NACE Rev. G).
sbs_na_ind_r2	Eurostat	Annual detailed enterprise statistics for industry (NACE Rev. 2 B-E).
tour_dem_exacw	Eurostat	Expenditure on tourist accommodation by country / world region of destination.
tour_dem_extotw	Eurostat	Expenditure on tourism by country / world region of destination.
tour_dem_extrw	Eurostat	Expenditure on tourist transport by country / world region of destination.
tour_occ_ninatc	Eurostat	Nights spent at tourist accommodation establishments by coastal and non-coastal area.
tour_occ_ninraw	Eurostat	Nights spent at tourist accommodation establishments by country/world region of residence of the tourist.
lfsi_emp_a	Eurostat	Employment and activity by sex and age - annual data.
nama_10_gdp	Eurostat	GDP and main components (output, expenditure and income).
Prodcom (DS-066341)	Eurostat	Sold production, exports and imports by PRODCOM list (NACE Rev. 2) - annual data.

Source: Own elaboration.

ABNJ	Areas beyond national jurisdiction
Adeupa	Agence D'urbanisme Brest-Bretagne
bcm	Billion cubic metres (of natural gas)
BBJ JU	Bio-Based Industries Joint Undertaking
CBA	Cost-benefit analyses
CCIMBO	CCI Métropolitaine Bretagne Ouest
CEF	Connected Europe Facility
CFP	Common Fisheries Policy
CLLD	Community-Led Local Development strategies
CMIP	Coupled Model Intercomparison Project
CNRS	Centre National de la Recherche Scientifique
d	Day
DCF	Dacta Collection Framework
EAD	Expected Annual Damage
EAPA	Expected Annual number of People Affected by coastal flooding
EASME	Executive Agency for SMEs
EDA	European Defence Agency
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EFSI	European Fund for Strategic Investment
EIB	European Investment Bank
EMFF	European Maritime and Fisheries Fund
EPC	Engineering, procurement and construction
ERDF	European Regional Development Fund
ESLs	Extreme Sea Levels
EU	European Union (28 Member States, including the UK)
€	Euro
FAO	Food and Agriculture Organisation of the United Nations
FTE	Full-time equivalent
GDP	Gross Domestic Product
GESE	Good Environmental Status
GOS	Gross Operating Surplus (=profit)
GVA	Gross value added (at factor cost)
GW	Gigawatt
ICES	International Council for the Exploitation of the Sea
IFREMER	Institut français de recherche pour l'exploitation de la mer
IMO	International Maritime Organization
IPCC	International Panel on Climate Change
ISA	International Seabed Authority
IUCN	International Union for Conservation of Nature
ivMS	Inshore vessel monitoring systems
Km	Kilometre
KW	Kilowatt
LNG	Liquefied Natural Gas
MPA	Marine Protected Area
MS	Member State
MSFD	Marine Strategy Framework Directive
MSY	Maximum Sustainable Yield
Mt	Megatonne
MW	Megawatt
NACE	Nomenclature des Activités Économiques dans la Communauté Européenne
OECD	Organisation for Economic Co-Operation and Development
OHI	Ocean Health Index

OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OTEC	Ocean Thermal Energy Conversion
OWC	Oscillating Water Column
ppm	Parts per million
R&D	Research and development
RCP	Representative Concentration Pathway
RES	Renewable energy sources
SBS	Structural Business Statistics
SDG	Sustainable Development Goal
SLR	Sea Level Rise
SPMs	Spatial Protection Measures
SREX	IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation
SSPs	Shared Socio-economic Pathways
UBO	Université de Bretagne Occidentale
UN	United Nations
\$	US Dollar
WWF	World Wide Fund for Nature

Member States codes

BE	Belgium
BG	Bulgaria
CZ	Czechia
DK	Denmark
DE	Germany
EE	Estonia
IE	Ireland
EL	Greece
ES	Spain
FR	France
HR	Croatia
IT	Italy
CY	Cyprus
LV	Latvia
LT	Lithuania
LU	Luxembourg
HU	Hungary
MT	Malta
NL	Netherlands
AT	Austria
PL	Poland
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
FI	Finland
UK	United Kingdom

COMPARATIVE ADVANTAGE. When an individual, firm or nation is able to produce a particular product at a lower opportunity cost than another individual, firm or nation. Forms the basis on which countries trade with one another.

ECONOMIC GROWTH. An increase in the output of goods and services in a country between two periods.

FACTOR COST. A measure of output reflecting the costs of the factors of production used, rather than market prices, which may differ because of indirect tax and subsidies (see GDP).

FACTORS OF PRODUCTION. The ingredients of economic activity / the human and natural resources needed to produce any good or service: land, labour, capital and enterprise.

GROSS DOMESTIC PRODUCT (GDP). The total market value of all final goods and services produced during a given time period within a country's borders. Equal to the total income of the nation's households or the total expenditures on the nation's output.

GROSS OPERATING SURPLUS. The surplus generated by operating activities after the labour factor input has been recompensed. It can be calculated from the value added at factor cost less the personnel costs. It is the balance available to the unit, which allows it to compensate the providers of own funds and debt, to pay taxes, and eventually finance all or a part of the investment.

GROSS INVESTMENT IN TANGIBLE GOODS. Investment during the reference period in all tangible goods. Included are new and existing tangible capital goods, whether bought from third parties or produced for own use (i.e. Capitalised production of tangible capital goods), having a useful life of more than one year including non-produced tangible goods such as land. Investments in intangible and financial assets are excluded.

NUMBER OF PERSONS EMPLOYED. Total number of persons who work in the observation unit (inclusive of working proprietors, partners working regularly in the unit and unpaid family workers), as well as persons who work outside the unit who belong to it and are paid by it (e.g. sales representatives, delivery personnel, repair and maintenance teams).

NOMINAL VALUE. The value of anything expressed simply in the money of the day. Since inflation means that money can lose its value over time, figures in real value adjust the nominal figures to remove the inflationary distortions.

PERSONNEL COSTS. The total remuneration, in cash or in kind, payable by an employer to an employee (regular and temporary employees as well as home workers) in return for work done by the latter during the reference period. Personnel costs also include taxes and employees' social security contributions retained by the unit as well as the employer's compulsory and voluntary social contributions. Personnel costs are made up of wages, salaries, and employers' social security costs.

SUSTAINABILITY. The ability to endure over time. Sustainable growth requires that resources be used at a rate at which they are able to replenish and that the environment is not spoiled in during the production process.

TANGIBLE ASSETS. Assets one can touch: buildings, machinery, gold, works of art, etc. Contrast with intangible assets.

TURNOVER. The total invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties; it includes all duties and taxes on the goods or services invoiced by the unit with the exception of VAT, invoiced by the unit to its customer and other similar deductible taxes directly linked to turnover; it also includes all other charges (transport, packaging, etc.) passed on to the customer.

VALUE ADDED AT FACTOR COSTS (GVA). The gross income from operating activities after adjusting to operating subsidies and indirect taxes. Value added at factor costs is calculated 'gross' as value adjustments (such as depreciation and impairment losses) are not subtracted. GVA can be calculated from turnover, plus capitalised production, plus other operating income (including operating subsidies), plus or minus the changes in stocks, minus the purchases of goods and services, minus other taxes on products which are linked to turnover but not deductible, minus the duties and taxes linked to production. Alternatively, GVA can be calculated from gross operating surplus by adding personnel costs.

