

STUDY ON DEEPENING UNDERSTANDING OF POTENTIAL BLUE GROWTH IN THE EU MEMBER STATES ON EUROPE'S ATLANTIC ARC

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Preface

This country fiche forms part of the Atlantic Arc sea basin study. Parallel sea-basin studies are being carried out on the North-Sea and the English Channel and the Mediterranean, Adriatic and Ionian and Black Sea and the Baltic Sea. The data definitions and template are adapted in such a way that exchange between the different sea-basins is made possible.

This country fiche contains all information that has been collected by the country editors. Results will be integrated in a seas basin report in which also a number of maritime economic activities are retained for in-depth analysis. This analysis and other analysis at a sea-basin level may provide further insights that can be incorporated in the country fiches at a later stage.

Comments received up to date have been incorporated in the present draft. A final version will be prepared based on the last round of comments. This final version will also be designed and edited to provide an easily accessible document.

Note:

Please note that chapter 5 (analysis of measures, policies and strategies to stimulate growth and good practices in the sea basin) has not been elaborated in the present draft final country paper. These will be still be added and addressed in the final country paper.

0. General overview

Country overview:

The population of the UK was 62.5 million at the end of 2011 in 23.4 million households.¹ Total employment was 29.4 million in 2012 and unemployment was 7.8 per cent in the last quarter of 2012.² Twenty per cent of the population is aged over 65.

The GDP of the UK in 2012 was 1.9 trillion Euros, which equated to Euro 30,500 per capita. Service industries accounted for 73 per cent of output in 2010.³ Of which around 20 per cent was government-supplied health, education and social work, around 20 per cent was financial and professional services and around 17 per cent was distribution, transport, hotels and restaurants. Production (manufacturing, utilities) and construction contributed a further around 20 per cent of output, with the construction sector being 6.5 per cent and manufacturing contributing 9.4 per cent. Declining output of North Sea oil and gas has depressed the growth rate in production and in the economy as a whole.

In 2012 the general government deficit was 5.2 per cent. In 2012/13 general government gross consolidated debt was 88.3 per cent of GDP.

Coastal regions:

The coastline of the United Kingdom is around 17,820 km (mainland only) or 31,368 km (mainland and principal islands). The Eastern seaboard faces the North Sea and the Western and South Western seaboard the Atlantic Arc.

On the Eastern seaboard, the principal conurbations are Edinburgh in Scotland, and in England: Newcastle and London. There are major ports from north to south at Forth, Tees and Hartlepool, Grimsby & Immingham, Felixtowe, London, Medway and Dover. On the Western seaboard, the principal conurbations are Glasgow in Scotland, and in England Liverpool, Cardiff, Bristol and Southampton. There are major ports at Milford Haven and Liverpool. These constitute to the top ten ports by freight in 2011, the largest being Grimsby & Immingham.

Most of the aquaculture occurs along the West Coast of Scotland and catching fish is based in Peterhead and Fraserborough on the East Coast of Scotland, with the North East of England and South West of England also active in fishing.

The North Sea is important for the UK's economy through the production of oil and gas, in particular the city of Aberdeen in Scotland, and renewable energy is playing an increasing role, with substantial investment in offshore wind in the shallower southern part of the North Sea, for example the 630 MW Thames Array. There are also developments in the North West of England and North Wales in the Irish Sea.

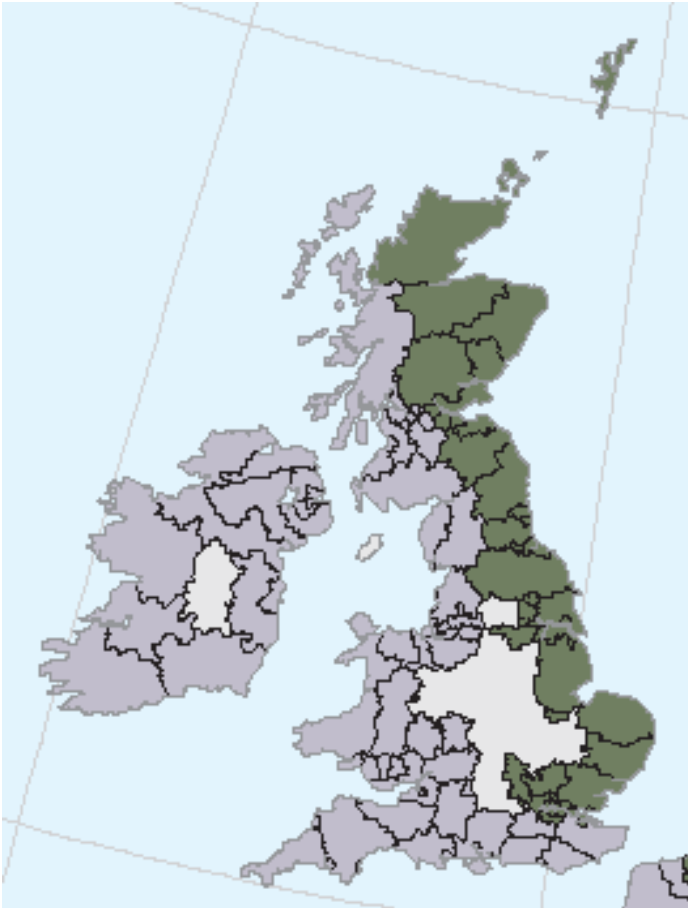
Around 17 per cent of the UK population lives within 10 km of the coast and 43 per cent within 20 km. This reflects the historic growth of cities located on major coastal rivers and the importance of sea-borne trade to Britain's economy in recent history.

Figure 1 – Coastal regions of the UK

¹ Eurostat

² Eurostat

³ UK Office for National Statistics National Accounts



Note: the regions are drawn at NUTS3 level. Those shaded green are designated North Sea and those shaded grey are designated Atlantic Arc by Eurostat

Source: Eurostat

Table 0 – Population living close to the coast in the United Kingdom

| Total population, million | Population resident within 10 km of coast, million | Proportion of total population resident within 10 km of coast | Population resident within 20 km of coast, million | Proportion of total population resident within 20 km of coast |
|---------------------------|--|---|--|---|
| 64 | 19 | 17% | 27 | 43% |

Source: Landscan, UK Office for National Statistics, personal communication European Commission, Vivid Economics calculations

1. Marine and maritime economic activities

1.1. Overview of maritime economic activities in the United Kingdom

This section provides an overview of the main maritime activities and their related socio-economic impacts in the Atlantic Arc and the other sea-basins **at a country (NUTS 0) level**. These economic activities are analysed, described and updated according to the NACE rev. 2 classifications.

The analysis is carried out in two steps:

- The first step focuses on the collection of **quantitative data** on the maritime economic activities. As far as possible data are based on Eurostat and official national statistics, where relevant (or necessary) complemented with alternative secondary sources. The methodology is harmonised across the different parallel sea basin studies.
- The second step provides a **qualitative review** of the maritime activities and their status. The information presented builds on the data collected, supplemented with specific inputs and analysis by the country editors.

Quantitative overview of maritime economic activities

Table 1 provides an overview of the most reliable data for each of the maritime economic activities⁴. More detailed information from all relevant sources is provided in **Annex I**. A separate Methodological Annex provides further explanation on the methodological assumptions and the underlying definitions that have been used.

⁴ The maritime economic activities are consistent with the activities discerned in the Blue Growth Study. In deviation to this study Shipbuilding and the Construction of Water projects are added as separate economic activities.

Table 1 – Quantitative overview of maritime activities in the United Kingdom

| Maritime economic activity | | GVA (EUR, millions) | Employment | Number of enterprises | Further indicators | Source & Reference year |
|---|---|------------------------|------------|--------------------------|-----------------------|--|
| 0. Shipbuilding | | | | | | |
| 0.1 | Shipbuilding (excl. leisure boats) and ship repair | 2,537 | 38,530 | - | Pr/pu | ONS |
| 0.2 | Construction of water projects | 279 | 1,656 | 292 | Pr | ONS |
| 1. Maritime transport | | | | | | |
| 1.1 | Deep-sea shipping | 1,415 | 13,048 | 647 | Pr | Eurostat, 2010 & ONS for employment |
| 1.2 | Short-sea shipping (incl. Ro-Ro) | 3,223 | 47,732 | - | Pr | Eurostat, 2010 & ONS for employment |
| 1.3 | Passenger ferry services | 976 | 75,677 | 539 | Pr | ONS |
| 1.4 | Inland waterway transport | 28 | 3,635 | 171 | Pu | ONS |
| 2. Food, nutrition, health and eco-system services | | | | | | |
| 2.1 | Catching fish for human consumption | 654 | 38,826 | - | Pr | ONS, MMO |
| 2.2 | Catching fish for animal feeding | 58 | 563 | - | Pr | JRC (fishing), PRODCOM (share of human/animal), 2010 |
| 2.3 | Marine aquatic products | 136 | 1,411 | 48 | Pr | JRC, 2010 |
| 2.4 | Blue biotechnology | - | - | - | - | - |
| 2.5 | Agriculture on saline soils | - | - | - | - | - |
| 3. Energy and raw materials | | | | | | |
| 3.1 | Offshore oil and gas | 36,364 | 32,867 | 1,100 | Pr | ONS, DECC |
| 3.2 | Offshore wind | n.a. | 10,600 | n.a. | Pr | RenewableUK |
| 3.3 | Ocean renewable energy | - | - | - | - | - |
| 3.4 | Carbon capture and storage | - | - | - | - | - |
| 3.5 | Aggregates mining (sand, gravel, etc.) | 23 | 1030 | - | Pr | Eurostat, 2010 & ONS for employment |
| 3.6 | Marine minerals mining | 0 | 0 | - | - | - |
| 3.7 | Securing fresh water supply (desalination) | 0 | 0 | - | - | Global Water Insights |
| 4. Leisure, working and living | | | | | | |
| 4.1 | Coastal tourism (England only for GVA, GB for employment) | 4,087 | 329,591 | - | Pr | Beatty et al. ⁵ & ONS for employment |
| 4.2 | Yachting and marinas | 28 | 1,400 | - | Pr | British Marine Federation |
| 4.3 | Cruise tourism | 395 | 4,017 | - | Pr | (low estimate) Eurostat, 2010 |
| 5. Coastal protection | | | | | | |
| 5.1 | Protection against flooding and erosion, preventing salt water intrusion, protection of habitats | - | - | - | Pu | - |
| 6. Maritime monitoring and surveillance | | | | | | |
| 6.1/ 6.2 | Traceability and security of goods supply chains, prevention and protection against illegal movement of people and goods, | - | - | - | Pu | - |
| 6.3 | Environmental monitoring | - | - | - | Pu | - |

⁵ Beatty C., Fothergill S., Gore T., Wilson I. (2010), 'The seaside tourist industry in England and Wales: Employment, economic outlook, location and trends', Centre for Regional Economic and Social Research, Sheffield Hallam University, June. This reference estimates seaside jobs supporting visitors to coastal areas, mainly in the retail, leisure, catering and hospitality sectors, which are over and above the background level of visitor-supported jobs that are typical away from the coast.

Note: a) activity is mainly predominantly triggered by public or private expenditure. Pr = private, pu = public. NB this does not mean that the activity is carried out by public companies.

b) GVA is expressed in Euros converted from UK Pounds at a rate of 0.83 £/€; the average for the year up to 6th August 2013.

Qualitative overview of maritime activities in the United Kingdom

Shipbuilding

The UK no longer builds merchant ships on any significant scale, but it does build ships for the Royal Navy.⁶ The UK has not built a warship outside the UK for 200 years except in times of crisis. The total UK defence budget is €41 billion per annum of which the total value of the destroyer programme alone is near €6.6 billion.⁷

The UK ship building industry focuses on military ships such as submarines, destroyers, aircraft carriers and other vessels for the Royal Navy.⁸ The country used to build offshore structures such as drilling rigs associated with the exploration and production of oil and gas from the North Sea, but is now much less active in that area, with production in the North Sea in decline. However, deep sea engineering and fabrication skills are still strong and are supporting the expanding offshore wind power sector, particularly along the east coast of England.

There are three major shipyards currently operating in Scotland: Govan (BAE Systems) and Scotstoun in Glasgow, and Rosyth (Aircraft Carrier Alliance: Babcock Marine, BAE Systems, the Ministry of Defence and Thales) in Fife, all of which rely on military contracts for their workload. Within the UK the Clyde will become the main British centre of excellence for naval surface ships, with the order for the complete run of Type-26 global combat ships, plus any export work, guaranteeing its future well into the next decade. Rosyth will get aircraft carrier refit work over 50 years.⁹

In 2012, the UK Government awarded £700 million of contracts to BAE Systems, Babcock and Rolls Royce for the design of a new nuclear deterrent submarine to replace the currently operational Vanguard class. In November 2012, there were around 1,930 people employed on the successor submarine programme. The total programme costs are around £20 billion, of which £14 to 14 billions is for the successor platform. The costs of running the programme once in service will be around 5 to 6 per cent of the defence budget.¹⁰

Research by the University of Strathclyde's Fraser of Allander Institute in 2009 suggested the UK warship building supported 15,000 jobs across the wider supply chain and contributed €721 million a year. BAE Systems employs 1,500 people in Portsmouth on shipbuilding and over 4,000 people in Barrow, Cumbria on submarines. Rosyth sustains over 1,000 jobs, Govan and Scotstoun nearly 2,800.

Total revenue of the UK leisure, superyacht and small commercial marine industry was €3.4 billion in 2011/12, employing 31,000 full time equivalents in around 4,200 businesses. Gross value added was €1,082 million. Revenue is the same level now that it was in 2005/06, but value added has fallen slightly from 37.6 to 31.4% of turnover between 2005/06 and 2011/12.¹¹ The sector is strongest in the south east and south west of England. Of these total figures, €1.3 billion of revenue was from the manufacture of boats, 61% of which were sales outside the UK. The UK has a strong presence in the design and manufacture of superyachts with a turnover of around €505 million per year and over 3,600 employees.¹² There is some overlap between the construction of naval and commercial ships, with some builders of fishing

⁶ House of Commons Scottish Affairs Committee (2013), *The Referendum on Separation for Scotland: Separation shuts shipyards*, HC892, January

⁷ Scottish Affairs Committee, *The Implications for Scotland of both the Strategic Defence and Security Review and the Comprehensive Spending Review*, 7 February 2012, HC 580-II, Session 2010-2012, Q 137

⁸ BAE Systems

⁹ House of Commons Scottish Affairs Committee (2013)

¹⁰ House of Commons Library, (2013), *Update on the Trident Successor Programme*, August

¹¹ British Marine Federation (2012), *UK Leisure, Superyacht and Small Commercial Marine Industry Key Performance Indicators 2011/12*.

¹² UK Marine Industries Alliance (not dated), *A strategy for growth for the UK Marine Industries*.

vessels also making small naval vessels. No further information was found relating to spillovers between the naval and commercial ship building sectors.

Construction of water projects

Construction of water projects is covered under the ports, renewables and energy. .

Maritime Transport

In 2011, the UK ports sectors directly employed 117,000 people and gross value added per worker was €81,015. The ports sector contributed around €9.5 billion in value added to UK Gross Domestic Product and over €2.4 billion in tax receipts.¹³ The UK has 57 major and 53 minor ports. UK ports handled 320 million tonnes of inbound freight and 180 million tonnes of outbound freight in 2011. Inbound tonnes have remained stable but outbound tonnage has fallen by a quarter over the last ten years. Total tonnage is now at the same level seen 20 years ago.¹⁴ While total port tonnage fell by 2 per cent, the minor ports experienced a faster decline, of 9 per cent. Grimsby and Immingham is the largest port, handling 60 million tonnes in 2012, followed by London, Milford Haven and Southampton. Dover was the busiest unitised port, handling 4.3 million units in 2012, and was ninth busiest by tonnage. The private sector operates 15 of the largest 20 ports by tonnage and around two-thirds of the UK's port traffic. Before the recent recession, the government produced forecasts of port activity to 2030, anticipating growth over a 2005 base of 182 percent in containers to 20 mteu, 101 per cent in ro-ro traffic to 170 mt and 4% in non-unitised traffic to 429 mt.¹⁵

Liquid bulk traffic has been declining while dry bulk has been increasing. Inbound container traffic has fallen by 6 per cent over the last ten years and outbound traffic by 2 per cent.

Declining output of natural gas from the UK Continental Shelf of the North Sea, lower world gas prices and the low greenhouse gas emissions from burning natural gas (compared to coal) have encouraged investments in gas import terminals in the UK. The Grain LNG is National Grid's liquefied natural gas facility near London. Opened in 2005, it can handle 14.8 million tonnes per year, and is one of the largest by capacity in Europe.¹⁶ The other major facility is the South Hook facility at Milford Haven, which opened in 2009, and is capable of bringing 15.6 million tonnes per year of gas into the UK. Each is able to supply 20 per cent of the UK's forecast gas demand.¹⁷ Other terminals include the Dragon Project in Milford Haven with capacity of 8.8 million tonnes per year and Teesport LNG with 3.0 million tonnes per year.

Investment in UK ports covered by the UK Major Ports Group, representing 70 per cent of tonnage handled, was €1.68 billion, a 38 per cent increase on the previous five years. Investment totalled 29 per cent of gross value added. Investment projects recently completed or currently in progress total €3.1 billion and include a new container port, London Gateway, with a cost of €1.8 billion.¹⁸ London Gateway will have capacity for 3.5 TEUs per year.¹⁹

Between 2005 and 2011 the following consents for container port development were granted:

Felixtowe: + 2 mteu

Harwich: +1.7 mteu

¹³ *Oxford Economics (2013), The economic impact of the UK Maritime Services Sector: Ports, February*

¹⁴ *Department for Transport (2013), Port Freight Statistics: Provisional Annual 2012, June.*

¹⁵ *Department for Transport (2011), National Policy Statement for Ports, October*

¹⁶ *Grain LNG*

¹⁷ *South Hook LNG*

¹⁸ *Oxford Economics (2013), Investment and productivity growth at UKMPG ports, June*

¹⁹ *DP World*

London Gateway: +3.5 mteu

Teesport: +1.5 mteu

Liverpool: +0.6 mteu

Bristol: +1.5 mteu

Southampton: +1.7 mteu

Deep sea shipping

Deep sea shipping is the third most valuable sector of water transport in the UK, contributed €1.42 billion of gross value added and €5.5 billion of turnover in 2011. It has experienced fast growth in the last 3 years. Gross value added has increased by 4% and employment increased by 7.4% in the last three years.

Liquid bulk tonnage is the largest component, and it is almost all oil, such that 40 per cent of all freight tonnage was oil in 2012. Dry bulk was 23 per cent, roll on roll of (ro-ro) was 19 per cent. Only 11 per cent was lift on lift off (lo-lo). Over the last decade, ro-ro and lo-lo traffic has been slowly increasing while dry bulk has remained static and liquid bulk has been steadily decreasing, falling by around 20 per cent over the last decade. Unitised traffic has fallen slightly over the last couple of years but is forecast to increase in the longer run (see discussion of ports).²⁰

In 2011, UK companies directly owned 22.5 million dwt, while UK companies had a controlling interest (parent ownership) in 35.2 million dwt. Since 1999, the deadweight tonnage of UK Registered shipping has grown more than six fold from a relatively low base, while UK owned tonnage has trebled, and UK parent owned and UK managed tonnage have both increased by almost 90 per cent.²¹

A long-run forecast of LNG traffic, made in 2007, suggested a rapid increase from 7.8 million tonnes of liquefied gas (LPG and LNG) in 2005 to 41 million tonnes in 2020, driven by reductions in nuclear power output, reduced reliance on coal in power generation and declining production of natural gas from the North Sea. Imports stabilise by around 2030. The long-run forecasts of oil products transport from the same source show a compound annual growth rate of only 0.2 per cent per year, rising from 85.9 million tonnes in 2005 to 90.2 million tonnes in 2030, with very little change in the balance of imports and exports. Finally, crude oil imports are expected to grow by around 2.1 per cent per year, although total crude oil shipped is forecast to fall from 153.5 million tonnes in 2005 to 133 million tonnes in 2030. This does not imply a need for any additional crude oil handling capacity at ports. Similar forecasts for coal imported for steam (power generation) and coking is stable tonnage from 2010 to 2030.²² Currently 98 per cent of LNG imports are sourced from Qatar although the US is planning to export LNG and may become a source in the future.

Since these forecasts were published in 2007 there has been a major economic recession and further development in policy to decarbonise the UK economy. As a result, some of the forecasts may be too high, and there is uncertainty over long-term hydrocarbon demand in the UK, particularly over the role of coal by 2030, which will affect both bulk liquid and dry bulk figures.

Currently 98% of LNG imports are sourced from Qatar, and the US may become a source in the future.

Short sea shipping

Waterborne freight between UK ports has been in decline in the UK for the last six years and now stands at around 300 billion tonne kilometres per year.²³ Traffic (tonne kilometres) fell 8 per cent between 2001 and

²⁰ Department for Transport (2013), *Port Freight Statistics: Provisional Annual 2012, June*

²¹ Department for Transport (2012), *Shipping Fleet Statistics 2011, September*

²² MDS Transmodal Limited (2007), *Update of UK port demand forecasts to 2030 & economic value of transshipment study*

²³ Department for Transport (2012), *Domestic Waterborne Freight 2011*

2011, and goods lifted (tonnes carried) fell by 16 per cent. Most goods are loaded in the East of Scotland and North East of England. Most are unloaded in the north west of England, where tonnage has been increasing in recent years. Short sea shipping takes place both between UK ports and with other EU ports. The majority of coastwise freight in the UK is petroleum products at 58 per cent of goods lifted in 2011 and 72% of goods moved.

58 per cent of the coastwise cargo lifted is petroleum products and 27 per cent is unitised traffic. The liquids traffic is mostly all lifted from the North East coasts of Scotland and England and delivered to the North West coast of England and Wales. It is oil travelling from the North Sea pipelines east to west coast refineries.

One-port freight has fallen by half in a decade, from around 40 million tonnes in 2001 to around 20 million tonnes in 2011. This is primarily a consequence of reduced landings from rigs, which has fallen from 19.6 million tonnes in 2004 to 7.2 million tonnes in 2011. The largest one-port category is now dredged aggregates, which was 13.8 million tonnes in 2004 and has fallen slightly to 11.8 million tonnes in 2011.²⁴ Figures from the Crown Estate suggest that 9.4 million tonnes of aggregates were dredged in England and 0.7 million tonnes in Wales.²⁵

Passenger ferry

International passenger numbers increased almost every year from 1950, 4.5 million, to 1994, 37 million, but have subsequently fallen steadily. They fell from 29.2 million in 2002 to 22.8 million in 2012 and are expected to decline further, due to competition from aviation (in particular low cost carriers) and the Channel Tunnel.²⁶ Most passenger ferry traffic is between the UK and continental Europe with smaller amounts between the Britain and Ireland. The largest port was Dover with 12.8 million passengers in 2011. The next largest ports were Holyhead and Portsmouth, with 2 million each. In comparison, the Channel Tunnel handled 17 million passengers and in 2010, UK airports handled 172 million passengers.

The top four players are P&O Ferries Division Holdings Limited, Carnival plc, David MacBrayne Limited and Fred.Olsen Cruise Lines Ltd. Other companies including Stena Line Limited and Disney Cruise Line contribute around 20 per cent market share in total. David MacBrayne Limited supplies ferry services in Scotland funded under public service contracts with the Scottish government and by revenue from ticket sales. It has experienced strong revenue growth in recent years²⁷. Cruise tourism benefits port hinterlands through site visits to tourist destinations.

There is competition between ferries, aviation and the Channel Tunnel (Eurostar and Eurotunnel Shuttle services). Low cost airlines have exerted pressure on ferry operators. Revenue generated is expected to fall from €4.1 billion in 2007/08 to €3.3 billion in 2012/13.²⁸ Fuel costs of passenger ferries, like those of other types of shipping, are expected to rise with the shift from Heavy Fuel Oil to Marine Gas Oil, a lower sulphur in line with the provisions of MARPOL Annex VI. The rise in fuel costs might be in the region 65 to 97 per cent.²⁹

Inland waterway transport

²⁴ Department for Transport (2011), *One-port traffic, goods lifted 2004-2011*

²⁵ The Crown Estate (2012), *Marine Aggregates The Crown Estate Licences Summary of Statistics 2012*.

²⁶ Department for Transport (2013), *UK international sea passenger movements 1950-2012, May*

²⁷ David MacBrayne Group (2012), *Group Annual Report and Consolidated Financial Statements*

²⁸ IBIS World Sea & Coastal Passenger Water Transport in the UK, H50.100, March

²⁹ House of Commons Transport Committee (2012), *Sulphur emissions by ships, Sixteenth report of session 2010-12, February*.

In 2011 traffic on UK inland waters was stable compared to 2010, with 43.9 million tonnes lifted and 1.4 billion tonne-kilometres moved.³⁰ However, there has been a long term slow decline from above 50 million tonnes in 2001. Around 10 per cent of the goods lifted are non-seagoing internal traffic (confined to inland waterways) and about the same amount is seagoing one-port traffic. The latter is aggregates being landed in the Low Countries. Around 7 million tonnes is coastwise sea-going traffic, but the remainder, around 30 million tonnes, is seagoing foreign traffic which is lifting or delivering goods to inland waters using river ports or ship canals.

The River Thames accounted for nearly half of the tonnes lifted at 18 million tonnes, and reported 5.6 million tonnes of aggregates landed. Next busiest was the River Forth at 8 million tonnes, and the Manchester Ship Canal and River Mersey. Only 10 per cent of the River Thames traffic is non-seagoing and other waterways carry much smaller amounts of non-seagoing traffic.

Again petroleum and petroleum products is the main liquid bulk item, 13 million tonnes of which 11.1 million tonnes was seagoing foreign traffic. 15.2 million tonnes was dry bulk and 9.1 million tonnes of unitised traffic (containers). Unitised traffic is the only category to have been increasing, rising from 6.3 million tonnes in 2001 to 3.9 million tonnes in 2011 and it is centred on Thames and Kent. Liquid bulk, centred on Scotland East Coast and dry bulk, centred on Thames and Kent, have both declined in recent years.

Food, nutrition, health and eco-system services

Catching fish for human consumption

The UK has 6,400 fishing vessels in 2011, compared with 7,700 a decade earlier, a reduction of 17 per cent. The number of fishermen fell in proportion, to 12,400.³¹ If all downstream dependent employment is included, the number of jobs is around 30,000 – 40,000.³² Of these vessels, 5,100 were less than 10 metres in length. The quantity of fish landed by UK vessels has declined over the last ten years, but its value has increased. The UK fleet is the second largest in the EU by gross tonnage and the fourth largest by power. Gross tonnage has fallen by 25 per cent and power has fallen by 20 per cent since 1996 as individual vessels have become more powerful, with new vessel average capacity and power increasing by 50 per cent since 1991. The English fleet is smaller and more numerous and the Scottish fleet is more powerful and less numerous.

600,000 tonnes of fish and shellfish were landed by UK vessels into the UK in 2011 with a value of €995 million. This is a decline from over 700,000 tonnes in 2001, but an increase in value from just under €721 million in 2001. The increase in value is due to a 40 per cent rise in the price of pelagic fish, which live near the surface as opposed to demersal fish, which live on or near the bottom.

The composition of landings has changed, with demersal fish taking a smaller share, one third, in 2011 compared with 2001, where they accounted for 50 per cent of value of landings. Demersal landings by weight fell by 27 per cent over the period. Shellfish landings rose by 3 per cent over the same period as effort shifted into shellfish, which are not governed by quota arrangements. Landings of scallops more than doubled since 2007, from around 25,000 tonnes to 55,000 tonnes in 2011. This reflects a 47 per cent increase in effort in area VII since 2001, although effort in some other areas decreased by similar proportions.

The reduction in demersal landings is a consequence of falling stocks of cod and haddock. Landings of cod are down 71 per cent since 1995 and haddock down 65 per cent. Together, this has cut 112,000 tonnes from landings. Mackerel and herring are the two key pelagic species. Mackerel landings have fallen around 20 per cent since 1995, to 182,000 tonnes and herring landings have fallen 47 per cent since 1995, to

³⁰ DfT 2012

³¹ Office for National Statistics

³² Crown Estate (2008) estimates 31,000; Eurostat estimates 44,000.

around 62,000 tonnes. There has been a small increase in nephrops landings, reflecting the changing food webs as white fish stocks have fallen and the high prices offered for nephrops.

In the UK, fishing is predominantly based in Scotland, where 60 per cent of landings were made in 2011, but most of the fishermen crew the smaller English boats. Thus there are 6,700 English fishermen and 5,000 Scottish. The contribution to UK catches from the sea areas West of Scotland (VIa) and Northern North Sea (IVa) are very much greater than any other area. Three Scottish ports, Peterhead, Lerwick and Fraserburgh account for 45 per cent by quantity and 39 per cent by value of all landings by UK vessels into the UK.

The most valuable UK species by live weight is sole, at nearly €10,818 per tonne. In contrast, Horse Mackerel only demands around €481/tonne at market.

Trade in fish and fish products have grown over the last decade, with imports rising from around 600,000 tonnes to 700,000 tonnes, while exports have remained static. The UK imports whitefish, shrimps, prawns and tuna. It exports mackerel and salmon. Most exports go to the France, the Netherlands and the United States of America.

The spawning stock biomass of cod remains severely depleted, and although fishing mortality is now close to precautionary levels, the stock remains much below its recommended limit at around one third of the precautionary stock level. The ICES assessment is that North Sea cod is suffering reduced reproductive capacity. A similar picture is found for the West of Scotland Cod stock. Again the spawning stock biomass is around one third of the precautionary level. Irish Sea Cod is in an even worse state, with the spawning stock biomass at around a tenth of the precautionary level and with fishing mortality remaining very high.

The North Sea haddock stock is in a better state. It is assessed as at full reproductive capacity and being harvested sustainably since 2002. The West of Scotland haddock stock is not in such a strong position. Its spawning stock biomass is well below target although reductions in fishing effort may be sufficient to allow the stock to recover.

North Sea plaice is assessed to be at full reproductive capacity and being harvested sustainably. Sole stocks are low in the North Sea and Western Channel. Mackerel stocks are above minimum limits but are being over-prosecuted.

Overall, the picture of stocks is one of substantial improvement in management in recent years, when judged against minimum stock and fishing mortality limits. Some stocks are now stable and growing but others are still at vulnerably low levels with fishing mortality still insufficiently contained.³³

Information on fishing vessel profitability is not reported here but can be found in *Seafish (2013), Economic Survey of the UK Fishing Fleet, May*.

Catching fish for animal consumption

UK production of fishmeal has fallen from 50,000 tonnes in 2002 to 38,000 tonnes in 2010. The reason for this decline is not clear, though a possible explanation is the decrease in stocks and quotas for certain species in recent years. Around 30 per cent of fishmeal is fed to pigs, 29 per cent to poultry and 20 per cent to farmed seafood. The remainder goes to beef rearing and wild seafood.³⁴

The largest component, 35 per cent in 2011, of fishmeal used in the UK and sourced from EU fisheries is trimmings, comprising small pelagic species such as mackerel, capelin and herring and from white fish processing. Around 8 per cent is from sprats and 8 per cent from sandeels. A further six per cent comes

³³ *Marine Management Organisation (2012), UK Sea Fisheries Statistics 2011*

³⁴ *Seafish (2011), Fishmeal and fish oil figures, October*

from a variety of species and the rest is sourced outside the EU.³⁵ The use of fish meal in animal feeds is not reported separately from poultry and other animal meal by Defra and so no further information is available.

Marine aquatic products

90 per cent of marine aquaculture by value takes place in Scotland. In 2012 there were 254 active marine sites in Scotland. It is almost exclusively the production of Atlantic salmon, at 94 per cent of output by value. Shellfish production, particularly mussels and Pacific oysters, makes up the residual. 57 per cent of output by value is exported. Total revenue could reach €721 million in 2013, with three firms producing 57 per cent of output. These firms are Marine Harvest (Scotland) Ltd, Scottish Sea Farms Ltd and The Scottish Salmon Co Ltd which is all owned by Norwegian parents or publicly listed in Norway. The world price of salmon in Sterling has doubled over the last ten years.³⁶

The Scottish Government (2011) estimates the output of marine aquaculture to be €522 million per year, of which €495 million is farmed Atlantic salmon. In 2009, 144,000 tonnes of Atlantic salmon was produced at 254 active marine sites, and 6,300 tonnes of mussels. The sector has attracted investment and grown rapidly over the last 20 years, having produced just 30,000 tonnes of Atlantic salmon in 1990.³⁷

Two thirds of mussel production is in Shetland and almost all oyster production in Strathclyde. Mussel production has risen from 4,000 to 6,000 tonnes per year over the decade to 2012 while Pacific oyster production has declined from 3,500 tonnes to 3,000 tonnes per year. Total value at first sale for all farmed shellfish in Scotland was £9 million in 2012.³⁸

There has been consolidation in the sector, with 48 companies active in 2003 and 2011 active in 2011. The number of production sites has also reduced from 176 to 98 and now 80 per cent of production comes from sites producing more than 1,000 tonnes a year. Production of Atlantic salmon has increased from 40,600 tonnes in 1991 to 158,000 in 2011. The total number of employees has fallen from 1,260 in 2001 to 1,010 in 2011. 90 per cent of these staff are full time. Productivity increased from 145 to 156 tonnes per person over the same period.³⁹ When shellfish is added to production of salmon, the total direct employment rises to around 1,400.⁴⁰ An estimate of the total employment effect, including dependent jobs in the supply chain is around 10,600.⁴¹

Blue biotechnology

Although there is substantial marine biotechnology activity in the UK, it does not receive a high profile or enjoy thematic status within research strategies at central government level. The word 'biotechnology' does not appear in the UK's marine science strategy.⁴² Nor is the word to be found in the industry's strategy paper.⁴³ The word 'marine' cannot be found in the Biotechnology and Biological Sciences Research Council

³⁵ *Seafish (2012), Annual Review of the status of the feed grade fish stocks used to produce fishmeal and fish oil for the UK market, March*

³⁶ *IBIS World (2013), Marine Aquaculture in the UK, March*

³⁷ *Scottish Government website, accessed 3rd August 2013*

³⁸ *Scottish Government (2013), Marine Scotland Science: Scottish Shellfish Farm Production Survey, 2012 Report, May*

³⁹ *The Scottish Government (2012), Scottish Fish Farm Production Survey*

⁴⁰ JRC

⁴¹ *Crown Estate (2008)*

⁴² *HM Government, Scottish Government, Welsh Assembly Government, Northern Ireland Executive (2010), UK Marine Science Strategy*

⁴³ *UK Marine Industries Alliance (2011), A strategy for growth for the UK Marine Industries*

strategic plan nor its delivery plan. The word is also absent from the UK's strategy for life sciences.⁴⁴ Nor is biotechnology prominent in discussion of marine science in Parliament.⁴⁵

Nevertheless, the UK does maintain academic centres of excellence and also harbours a number of commercial marine biotechnology firms. Descriptions of some of the centres of excellence as described in 2009 by a government department are reproduced below.

- The Scottish Association for Marine Sciences provides expertise in isolating novel natural products from marine bacteria. It has developed commercially exploitable bio emulsions and bio surfactants for use in healthcare, food, bioremediation, waste management and textiles.
- The European Centre for Marine Biotechnology stimulates the development of biotech companies by conducting commercial research, acting as an incubator for start-ups and providing a unique collection of algae and protozoa cultures for research by businesses and academics. Strong and commercial marine biotech R&D programmes are under way at the Marine Biological Association of the UK, Plymouth Marine Laboratory, and the University of Plymouth's Algal Research Group.
- The Institute of Aquaculture at Stirling University is the largest of its kind in the world, dealing in every aspect of aquaculture from fish health and nutrition to genomics and genetics. The University of Aberdeen has several departments and associated institutes interacting to create an important platform in marine biotechnology developments. The Centre for Sustainable Aquaculture Research and Aquaculture Wales – based at Swansea University – focuses on the use of advanced engineering for environmentally sustainable aquaculture and mariculture. Other notable centres of excellence include the University of Southampton for deepsea technologies.⁴⁶

Aquaculture in saline soils

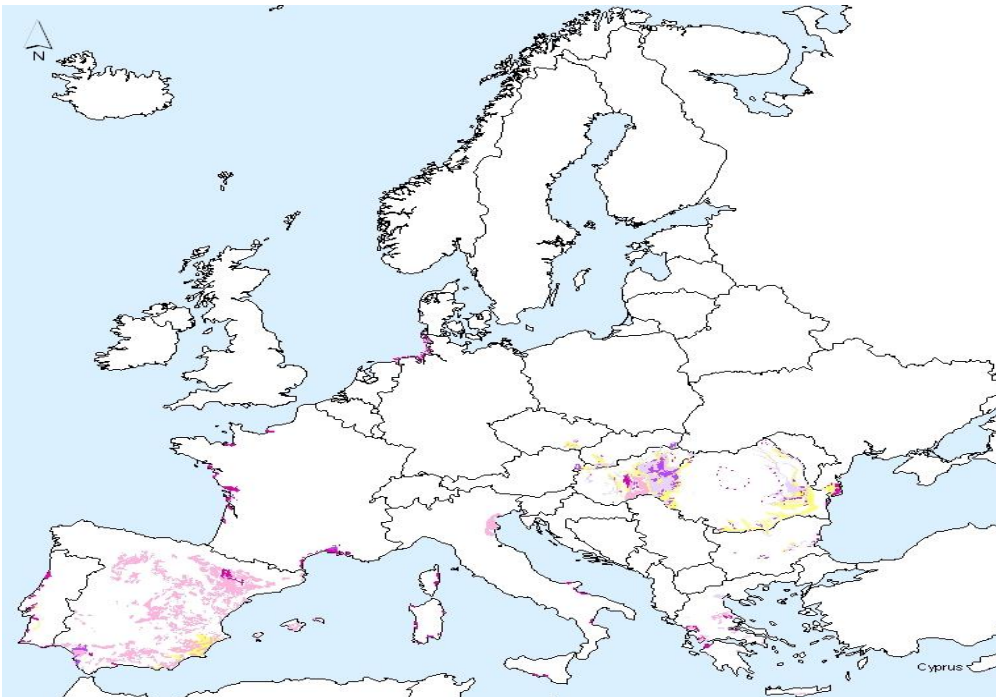
According to the Joint Research Centre data, there are no saline and sodic soils in the UK, see map in Figure 2.

⁴⁴ *Biotechnology and Biological Sciences Research Council (not dated), The Age of Bioscience: Strategic Plan 2010-2015. BBSRC (not dated), BBSRC Delivery Plan 2011-2015: Maximising Economic Growth in The Age of Bioscience. Department for Business, Innovation and Skills; Office for Life Sciences (2011), Strategy for UK Life Sciences, December*

⁴⁵ *House of Commons Science and Technology Select Committee (2007), Investigating the Oceans: Tenth Report of Session 2006-07, October*

⁴⁶ *Department for Business, Enterprise and Regulatory Reform (2009), Maximising UK Opportunities from Industrial Biotechnology in a Low Carbon Economy, IB 2025, May*

Figure 2 – Saline and sodic areas in the EU



Note: Saline and sodic areas at various level are indicated on the map
 Source: European Commission Joint Research Centre

Energy and raw materials

Offshore oil and gas

The UK Continental Shelf reached its peak oil and gas production in 1999 and since then production has fallen by more than half. In 2011, fewer wells were drilled than in any year since 1965, although the figure recovered in 2012.

The UK oil and gas industry generates a source of employment for over 400,000 people, of which 32,000 are directly employed in the industry. It is Britain's largest industrial investor, investing €13.8 billion in 2012, probably increasing to €16.8 billion in 2013. It supplies almost half of the UK's primary energy needs and boosts the balance of payments by €60 billion a year. However, it only spends 0.3 per cent of sales on research and development, one tenth of the level of Norway's industry. 21 per cent of UK refinery crude throughput comes from the UK Continental Shelf. According to Oil and Gas UK, in 2012 the industry was providing employment for 440,000 people across the whole country:

The exploration for and extraction of oil and gas from the UKCS accounts for around 340,000 of these jobs, comprising:

- 32,000 directly employed by oil and gas companies and their major contractors;
- 207,000 within the wider supply chain;
- 100,000 jobs supported by the economic activity induced by employees' spending.

In addition, an exports business is estimated to support a further 100,000 jobs.⁴⁷

There are around 470 installations, 10,000 kilometres of pipeline and 5,000 wells in the UK Continental Shelf suggesting a large programme of decommissioning as production declines.

The UK supply chain comprises 1,100 companies achieving combined revenues of €32 billion in 2011.⁴⁸

⁴⁷ Source: <http://www.oilandgasuk.co.uk/employment.cfm>

⁴⁸ HM Government (2013), *UK Oil and Gas: Business and Government Action*, March

The number of offshore oil fields in production has risen to 190 in 2011 from 168 in 2006. The number under development stayed roughly constant at 14. The number of offshore gas fields has also risen from 115 to 132, with 5 under development in 2011. The size of fields commencing production has fallen dramatically. In 2011 it was 0.7 million tonnes of oil equivalent. In the years 1965-70 it was 115 million toe. The size of fields commencing production has declined fairly continuously since 1970. Over the decade to 2011, oil production fell by a half to around 55 million toe and natural gas by a similar fraction to around 50 million toe.

42.5 per cent of UK crude oil production is sent to UK oil refineries, with the rest exported to the Netherlands, Germany, the USA, France and other countries, in declining order of quantities.⁴⁹

Tax revenues from UK oil and gas production in 2012/13 were €7.81 billion, comprising €2 billion of production taxes and €5.8 billion of corporate taxes. This figure was lower than 2011/12 due to a reduction in oil prices. The tax regime comprises 50 per cent of profits before corporation tax, a 32 per cent supplementary charge on a company's ring fence profits, and a tax rate of 30 per cent on ring fence profits. 100 per cent first year capital allowances are allowed.⁵⁰

Offshore wind

Offshore wind output increased by 2,337 GWh to 7,463 GWh and capacity by 1.3 GW to 1,995 GW between 2011 and 2012. In 2012, 18 per cent of electricity produced from renewable sources was generated by offshore wind. The load factor of offshore wind plant was 35.2 per cent in 2012. This compares with 26.2 per cent for onshore plant.⁵¹

The UK has more offshore wind turbines than any other country, with more than 1,000 and a combined capacity of about 3.6 GW at the end of June 2013. In 2021, under a strong growth scenario, the sector could deliver in the order of €8.4 billion of gross value added to the UK economy and support over 30,000 full time equivalent UK jobs⁵².

The government is contributing around €24 million over several years to promote development of the supply chain. It has also set expenditure limits on price support consistent with 8 to 16 GW of offshore wind deployment by 2020, with a view to deploying between 18 and 39 GW of plant by 2030, dependent on the level of unit costs. There are now nearly 30 vessels operating from the Port of Grimsby servicing offshore wind farms. There is around €120 million of financial support to develop innovative offshore wind technologies between 2011 and 2015. This includes €55 million from the Technology Strategy Board with the aim to reduce costs to €120/MWh, and €21.6 million from DECC to develop new foundations. The UK Government is also participating in investment, with its Green Investment Bank planning to co-invest €1.2 billion in offshore wind by March 2015.⁵³

The total number directly employed in offshore wind and marine renewable energy was around 10,600 in 2010.⁵⁴

⁴⁹ DECC (2012), *Digest of United Kingdom Energy Statistics 2012*, July

⁵⁰ HM Revenue and Customs (2013), *Statistics of Government revenues from UK oil and gas production*, June.

⁵¹ DECC (2013), *Renewable energy in 2012*.

⁵² BVG Associates estimate, taken from HM Government (2013), *Offshore Wind Industrial Strategy: Business and Government Action*, August: 'this is based on a scenario of 16GW installed by end 2020, with 50% UK content in capital expenditure and 85% content in operational expenditure.'

⁵³ HM Government (2013), *Offshore Wind Industrial Strategy: Business and Government Action*, August

⁵⁴ RenewableUK (2011), *Working for a Green Britain*, Volume 2, July

Ocean renewable energy

It is estimated that the UK has potential for between 25 and 30GW of ocean renewable energy, enough to supply around 12 per cent of current UK electricity demand⁵⁵. The majority of this is in the Severn estuary, between 8 and 12GW, with the estuaries and bays of the North West representing a similar amount and the east coast a further 5 to 6GW. The 2-year cross-government Severn tidal power feasibility study could not see a strategic case for public investment in a Severn tidal scheme in the immediate term because the costs are high, though private sector groups are continuing to investigate the potential.

In 2011, around 4 MW of prototypes were undergoing testing in the UK. There are two main tidal power generating methods that have been tested: tidal stream, which uses the kinetic energy of moving water, and tidal barrage, which uses the gravitational potential energy from the difference in height of water in low and high tides. There is currently one operational 1.2MW tidal stream turbine in Strangford Narrows in Northern Ireland. In addition, a number of tidal stream and wave energy devices, ranging up to 1MW, have been deployed at the European Marine Energy Centre (EMEC) in Orkney for testing. There are no tidal barrage schemes in the UK at present.

The UK has built several tidal and wave testing facilities. The European Marine Energy Centre (EMEC) in the Orkneys was created through a mixture public sector funding in 2003 when the wave testing site was opened, followed by a tidal testing site in 2007. The Wave Hub wave array testing facility was deployed off the coast of Cornwall in 2010 and will provide facilities to demonstrate small arrays of wave energy devices, up to a total of 20MW. Alongside the facilities at EMEC and Wave Hub the Government has also funded an onshore tidal drive train testing facility at the National Renewable Energy Centre in the North East of England. A handful of small companies are developing wave and tidal technologies and testing them at these facilities.

For those technologies which progress past the demonstration tests, the Crown Estate has awarded commercial leases in the Pentland Firth and Orkney Waters for 1.6 GW of marine generation, the first of its kind anywhere in the world.⁵⁶

Expectations of deployment by 2020 have been reduced between the government's 2010 and 2012 action plans. Funding has also been cut back. The current UK government programme is €24 million and the Scottish Government has allocated a further €21.6 million. A Parliamentary committee regarded these sums as too low given the costs of deploying test arrays.⁵⁷

Carbon Capture and storage

The UK Government has run a competition to receive funding to build and operate carbon capture and storage plant. In March 2013, it announced two preferred bidders:

- Peterhead, Scotland, existing gas fired power station at Peterhead storage in depleted hydrocarbon field in North Sea; Shell and SSE;
- White Rose, North East England, new super-efficient coal-fired power station at Drax, storage in saline aquifer in the southern North Sea; Alstom, Drax Power, BOC and National Grid.

The Government plans to take a final decision early in 2015 on the construction of up to two projects. It has set aside up to €1.2 billion in capital funding and has legislated to allow operational support costs to be

⁵⁵ DECC (2011), *UK Renewable Energy Roadmap, July* (estimate taken from a number of sources, including 2050 DECC, PIRC Offshore Valuation 2010, Carbon Trust TINA & Green Energy Growth April 2011, Ernst & Young 2010)

⁵⁶ DECC (2011), *UK Renewable Energy Roadmap, July*

⁵⁷ *House of Commons Energy and Climate Change Committee (2012), The Future of Marine Renewables in the UK, Eleventh Report, February*

recovered from electricity consumers through a levy. It will also support applications from these projects for the European NER300 second round funding.

The UK has a €150 million CCS research, development and innovation programme via the Technology Strategy Board, the Energy Technologies Institute and the Research Councils. This is funding around 100 projects, of which €66 million is fundamental research, €32 million technology components and €52 million for pilot scale projects.

The UK has only one carbon capture plant, a 5 MWe amine post-combustion pilot plant at Ferrybridge power station, capturing up to 100 tonnes of carbon dioxide a day.⁵⁸

Aggregates mining

Sand and gravel are dredged within UK waters and landed for UK consumption or taken for export. Sales declined by 24 per cent from 14.4 Mt in 2005 to 11.0 Mt in 2009. Primary aggregates sales in England and Wales in 2009 comprised 31.4 per cent land won and 9.2 per cent marine-dredged sand and gravel, with crushed rock making up the remaining 59.4 per cent. Marine sand and gravel supplied about 22 per cent of total sand and gravel output in England, compared with 47 per cent in Wales. Substantial quantities, about 5.7 Mt, of marine sand and gravel dredged from the UK Continental Shelf were landed at foreign ports in 2009. A further 4.5 Mt of marine sand and gravel were used for contract fill and beach nourishment. Due to the quantity of marine sand and gravel landed at foreign ports, the UK is a net exporter of aggregates.

Concreting aggregate was the largest use for both land-won and marine-dredged sand and gravel, accounting for some 62 per cent and 78 per cent of the respective totals for aggregate use. The South East dominates marine-dredged sales of sand and gravel at 5.0 Mt, with London at 3.7 Mt the second largest, followed by South Wales 0.6 Mt.⁵⁹

Marine sand and gravel extraction was at a similar level in 2005 to the level it had been in 1970, having grown rapidly through the 1960s. Sales topped €300 million in 2006. The fleet of 28 dredgers with a total hopper capacity of 112,000 tonnes and a replacement value of around €1.2 billion. The larger vessels are 4,000 – 8,000 tonne capacity and will produce 1.0 million tonnes in a year, more output than the largest sand and gravel quarries on land. The industry employs about 640 staff, 500 of whom are ships' officers and crew. A further 600 staff are employed directly on the wharves which receive UK marine aggregates. Eurostat states a slightly lower direct employment figure of 410 jobs. The three largest operators are CEMEX UK Marine with 30,000 tonnes hopper capacity, Hansom Aggregates Marine with 43,800 tonnes and United Marine Dredging with 14,600 tonnes. The total licensed area for marine aggregate extraction in 2006 was 1,316 km², but 90 per cent of dredging took place within an area of 49 km². In 2005 the declared primary reserve of permitted coarse marine aggregate was 114 million tonnes.⁶⁰

Table 2 – Aggregates extraction by region in the UK

| Region | Permitted Removal | Primary Aggregates Licences | Beach Nourishment | Reclamation Fill | Total Removal |
|--------|-------------------|-----------------------------|-------------------|------------------|---------------|
| Humber | 12.5 | 9.9 | 47.7 | 0.0 | 13.8 |

⁵⁸ DECC (2012), *CCS Roadmap, April*. DECC (2013), *DECC Guidance on EU Funding Mechanism "NER300" for Carbon Capture and Storage (CCS) Demonstration Projects—Second Call for Proposals, April*. DECC website

⁵⁹ Department of Communities and Local Government, British Geological Survey, Welsh Assembly Government (2011), *Collation of the results of the 2009 aggregate minerals survey for England and Wales, October*

⁶⁰ Highley, D.E., Hetherington, L.E., Brown T.J., Harrison, D.J. and Jenkins, G.O. (2007), *The strategic importance of the marine aggregate industry to the UK, British Geological Survey Research Report OR/07/019*.

| | | | | | |
|-----------------------------|------|------|------|-------|------|
| East Coast | 28.1 | 24.3 | 0.0 | 0.0 | 21.2 |
| Thames Estuary | 4.6 | 7.4 | 0.0 | 0.0 | 6.5 |
| East English Channel | 20.3 | 24.3 | 11.7 | 0.0 | 22.4 |
| South Coast | 22.7 | 24.8 | 40.6 | 0.0 | 26.0 |
| South West | 8.1 | 7.3 | 0.0 | 0.0 | 6.4 |
| North West | 3.7 | 1.9 | 0.0 | 100.0 | 3.8 |

Note: Aggregates mining by coastal region (percentage)

Source: Marin Aggregates, The Crown Estate Licences 2012

Marine minerals mining

The only marine minerals extracted in the UK are aggregates and are covered in the section above. No other marine minerals are mined in the UK.

Securing fresh water supply

There is one desalination plant in the UK, operated by Thames water at its Beckton site in East London. The plant takes water from the tidal River Thames and uses reverse osmosis to supply up to 140 MI of water per day. The plant is only used at times of water shortage. It was opened in 2010 and is powered by renewable energy from a biomass combined heat and power plant.

No other desalination plant is planned, but Southern Water Services is consulting on a 1.5 MI per day desalination plant for the Isle of Wight as an option in its long term water resources management plan. This plant would not come on line until 2032.

Leisure and tourism

Coastal tourism

Across the UK as a whole, 8 per cent of tourism day visits are to the seaside or coast. This figure was slightly lower in 2012 (the Olympics year) than in 2011, although the absolute number of seaside and coastal visits increased. The figure is higher for Wales at 18 per cent, and in North Wales the figure is 36 per cent. The total number of visits primarily to the coast or seaside was 139 million and total expenditure was €5.8 billion, of which 4.6 billion was in England, €0.3 billion in Scotland and €0.84 billion in Wales. There was an additional 24 million visits which were primarily to another type of destination but also took in a seaside or coastal place.⁶¹

7 per cent of the UK population go coastal walking and 12.3 per cent spend general leisure time at the beach. Two thirds of all watersports activities occur at the coast, the largest numbers being for outdoor swimming, boarding and angling.⁶²

The largest single seaside tourist destination is Greater Blackpool in the north west of England, where tourism supports 19,400 jobs. The next largest are Greater Bournemouth and Greater Brighton in the south with 12,000 jobs each. Torbay in the south west is fourth with 9,200 jobs. In all, there are estimated to be

⁶¹ VisitEngland, VisitScotland, Visit Wales (2013), The GB Day Visitor Statistics 2012, April

⁶² Arkenford (2012), Watersports Participation Survey 2012: Executive Summary

58 seaside towns where more than 1,000 jobs are supported by coastal tourism. In some places, notably Newquay and St Ives in the south west, the dependency of local employment on coastal tourism is very high, estimated at around three quarters and they are not alone in this regard. Dependency on tourism can be reduced by diversifying the local economy, as has been achieved by Brighton. Coastal towns account for a disproportionately high percentage of England's deprived areas, with nine out of ten of the South East's most deprived wards in coastal towns or cities⁶³.

Overall perhaps 210,000 jobs are directly supported by seaside tourism in England and Wales.⁶⁴ Of this total, around half are employed in hotels, restaurants, cafes and bars. A further 28,000 in caravan and holiday parks and 55,000 in the retail sector. Sports, cultural and recreational activities account for a further 16,000 jobs and transport 5,000. Other sources suggest employment of around 300,000.⁶⁵ The Crown Estate published a lower figure, of around 90,000, by taking a national tourism employment estimate and apportioning a fraction of it to coastal tourism according to the proportion of tourism gross value added by coastal towns.

The economic contribution expressed as gross value added is estimated to be €334 million for Greater Blackpool, €310 million for Greater Brighton and €213 million for Greater Bournemouth, which together with other places, give a total figure of €4.1 billion per year directly attributable to seaside tourism. These figures are in 2009 money. Nearly one third of this figure is in the South East, the same again in the south west, and one sixth east in the east and North West.

The data show an increase in employment between 1998/2000 and 2006/08 of about 14,000 jobs in the principal seaside towns, which is an increase of around 10 per cent. The figure for the whole of England and Wales is probably around 20,000.⁶⁶

Yachting and marinas

Coastal marinas had revenues of €118 million in 2011/12 and employed 1,400 people, excluding those employed in the building of boats (detailed elsewhere in this report).⁶⁷ There are 227 UK inland marinas accounting for 27,700 offline berths. The core revenue is €47 million, employing almost 900 people. The gross value added is around €23 million. For every job in core inland marinas a further 10 jobs are generated in the local economy and the indirect gross value added is estimated at a multiple of seven.⁶⁸ Additional jobs generated by the industry include suppliers, vessel maintenance, boatyards, boat hire, catering and hospitality as well as visitors and employee expenditures in the wider economy via the multiplier effect.

Cruise tourism

More than 1.7 million British passengers took an ocean cruise holiday in 2012, a doubling since 2002. An increasing proportion of cruise passengers visit UK ports, with close parity between fly-cruises and domestic departures. Cruising now represents 4.7 per cent of foreign holidays taken by British people, and a higher proportion for older holidaymakers: the average age of cruise passengers is 56. Norwegian fjords are the most popular destination for British cruise passengers and demand for European destinations

⁶³ *House of Commons, Communities and Local Government Committee (2007), Coastal Towns*

⁶⁴ Beatty et al (2010)

⁶⁵ Eurostat and UK Office for National Statistics

⁶⁶ *Beatty C., Fothergill S., Gore T., Wilson I. (2010), The Seaside Tourist Industry in England and Wales, Centre for Regional Economics and Social Research, Sheffield Hallam University, June*

⁶⁷ *British Marine Federation (not dated), UK Leisure, Superyacht and Small Commercial Marine Industry: Key Performance Indicators 2011/12*

⁶⁸ *British Marine Federation, Economic Benefits of Inland Marinas in the UK*

overall cruises rose by 14% between 2011 and 2012. Summer ultra-luxury cruises have seen the strongest growth, up by 30%, between 2011 and 2012.⁶⁹ Direct employment on cruise ships is around 4,000 jobs.⁷⁰ The number of people employed by cruise lines in the UK is higher, at 10,500 jobs.⁷¹

Coastal protection

Coastal protection is a power devolved to the regional administrations for which the operational agencies are the Environment Agency in England, Natural Resources Wales in Wales, and the Scottish Environment Protection Agency in Scotland.

There are 1,970 km of manmade sea defences in England and of the 4,500 km of coast in England, 1,800 km is at risk of coastal erosion, of which 340 km is defended. Only 200 properties are currently vulnerable to coastal erosion, but by 2029 that figure may have risen to 2,000.⁷²

It is estimated that significant assets are at risk over the next few decades in England because of coastal change. These include more than €178 billion from coastal flooding around the UK, €90 billion from flooding in London and €12 billion from coastal erosion across the UK.⁷³ In England, the Environment Agency has reserved funding for 152 coastal protection and flooding investments totalling €1.2 billion to commence in 2013/14, and a further €511 million to begin the year after. Some of the projects will take four years to complete. They include beach management, sea walls, sea defences, flood gate repair and defences against river flooding. A further €1,021 million of projects have been identified for the period commencing 2018/19.⁷⁴

In Scotland, the Scottish Flood Defence Asset Database published in 2007 identifies seven coastal flood defence schemes. Two new schemes have been added since that date. There are estimated to be 24,900 residential and 2,384 commercial properties at risk of a 1 in 200 year coastal flood.⁷⁵ Scotland is in the process of developing 14 Local Flood Risk Management Plans. It intends to have agreement on funding by December 2015 and to have completed execution of the plan by June 2022.⁷⁶

In 201/12 the Welsh Government committed €44 million to flood and coastal erosion risk management in Wales. It estimates demand for up to three times this budget in the future to maintain current protection levels. It does not report separate figures for fluvial flooding and coastal flooding and defence. It also receives funding from the European Regional Development Fund, and has used this funding to support two large coastal defence schemes at Borth and Colwyn Bay.⁷⁷

Maritime monitoring and surveillance

⁶⁹ *Passenger Shipping Association (2013), The Cruise Review, March*

⁷⁰ Eurostat and UK Office for National Statistics

⁷¹ Crown Estate (2008) reporting figures from European Cruise Council

⁷² *Defra, Environment Agency (2011), Understanding the risks, empowering communities, building resilience: The national flood and coastal erosion risk management strategy for England.*

⁷³ *Parliamentary Office of Science and Technology, Coastal Management, Postnote no 342, October*

⁷⁴ *Environment Agency (2013), 2013/14 Flood and Coastal Risk Programmes of Work Approved by Regional Flood & Coastal Committees, February*

⁷⁵ *Ball T., Werrity A., Duck R.W., Edwards A., Booth L., Black A.R. (2008), Coastal Flooding in Scotland: A Scoping Study, SNIFFER, August*

⁷⁶ *SEPA, Natural Scotland (2012), Flood Risk Management Planning in Scotland: Arrangements for 2012 – 2016, February*

⁷⁷ *Welsh Government (2011), National Strategy for Flood and Coastal Erosion Risk Management in Wales, November*

The Maritime and Coastguard Agency is responsible for promoting and enforcing high levels of maritime safety and security, preventing pollution from ships and maintaining the quality of ships on the UK Ship Register. It inspects ships, assures the work of independent classification bodies and issues certificates of competency to seafarers. It employs 160 marine surveyors.⁷⁸ The Agency's total expenditure is around €156 million per year.⁷⁹

The UK Border Agency administers immigration and customs checks at UK borders. It does not separately report resources and expenditure for marine ports.

Cefas provides scientific and management advice on fish stocks and fishing. It works on marine planning and licensing, and surveys habitats for the establishment of marine conservation zones and it researches disease threats to commercial species in which area it operates a surveillance programme for 18 notifiable aquatic animal diseases. It also advises on shellfish hygiene. Cefas had a turnover of €62.5 million in 2011/12.⁸⁰ There may be other programmes of monitoring of the seas but no information was found collating expenditure across these programmes.

An introduction to marine planning can be found in *HM Government (2011), UK Marine Policy Statement, March*.

⁷⁸ National Audit Office (2009), *The Maritime and Coastguard Agency's response to growth in the UK merchant fleet*

⁷⁹ Maritime and Coastguard Agency (not dated), *Business Plan 2013-14*

⁸⁰ Centre for Environment, Fisheries and Aquaculture Science (2013), *Annual Report and Accounts, June*

1.2. Breakdown of maritime economic activities at regional level and allocation to different sea-basins

This section allocates the data from table 1 to maritime regions in the United Kingdom. The results of this analysis are intended to provide a breakdown of maritime economic activities at regional level and to assess maritime regions.

The breakdown of economic activities is done at NUTS 1 or NUTS 2 level, depending on the availability of data. Besides, the level of regional analysis is determined by where maritime policy strategies and funding programmes are decided (please see suggested level highlighted in bold).

Table 3 - Breakdown of maritime economic activities at regional level

| EU Member State | NUTS 1 | NUTS 2 | Geographical allocation to Sea-basin (NUTS 2 regions) |
|-----------------|--|--|---|
| UK | North East England | Tees Valley and Durham | North Sea |
| | | Northumberland and Tyne and Wear | North Sea |
| | North West England | Cumbria | Atlantic Arc |
| | | Cheshire | Atlantic Arc |
| | | Lancashire | Atlantic Arc |
| | | Merseyside | Atlantic Arc |
| | Yorkshire and the Humber, England | North Yorkshire | North Sea |
| | | East Riding and North Lincolnshire | North Sea |
| | East Midlands | Lincolnshire | North Sea |
| | East of England | East Anglia | North Sea |
| | | Essex | North Sea |
| | South East England | Surrey, East and West Sussex | North Sea |
| | | Hampshire and Isle of Wight | North Sea |
| | | Kent | North Sea |
| | South West England ⁸¹ | Gloucestershire, Wiltshire and Bristol/Bath area | Atlantic Arc |
| | | Dorset and Somerset | Atlantic Arc/North Sea |
| | | Cornwall and Isles of Scilly | Atlantic Arc/North Sea |
| | | Devon | Atlantic Arc/North Sea |
| | Scotland | Eastern Scotland | North Sea |
| | | North Eastern Scotland | North Sea |

⁸¹ For the NUTS 2 level regions Dorset and Somerset, Cornwall and Isles of Scilly as well as Devon, we will use a workable split according to the sea-basin (of 50/50 split in both sea-basins, unless a clear rationale can be provided for a different allocation, e.g. a large port on one of the sea-basins etc.).

| EU Member State | NUTS 1 | NUTS 2 | Geographical allocation to Sea-basin (NUTS 2 regions) |
|------------------------|-------------------------|----------------------------|--|
| | | South Western Scotland | Atlantic Arc |
| | | Highlands and Islands | Atlantic Arc |
| | Wales | West Wales and the Valleys | Atlantic Arc |
| | | East Wales | Atlantic Arc |
| | Northern Ireland | Northern Ireland | Atlantic Arc |

Table 4 presents the percentage share of each region per specific maritime economic activity. This share can be applied both to the GVA figures and the employment figures in table 1. As hardly any data can be found in regionalised statistics allocation has been done on the basis of other parameters. The methodology used is explained in footnotes to the table.

Table 4 - Overview of employment per maritime economic activity per region in the UK⁸²

| Sea-basin | North Sea | North Sea | North Sea | North Sea | North Sea | Atlantic Arc | Atlantic Arc | North Sea | Atlantic Arc | Atlantic Arc | Atlantic Arc | |
|--|------------|-------------------|---------------|-----------------|--------------------|--------------|--------------------|-----------|--------------|--------------|------------------|---------------------|
| Regional allocation (in %) that applies to employment and GVA data | North East | Yorkshire, Humber | East Midlands | East of England | South East England | North West | South West England | Scotland | Scotland | Wales | Northern Ireland | Other / Unspecified |
| 0. Shipbuilding | | | | | | | | | | | | |
| 0.1 Shipbuilding (excl. leisure boats) and ship repair | 2.7 | 2.9 | 3.8 | 3.7 | 15.4 | 18.2 | 30.8 | 4.5 | 12.8 | 2.6 | | 2.3 |
| 0.2 Construction of water projects | 12.3 | 6.6 | 2.7 | 5.6 | 25.2 | 9.6 | 7.7 | 16.2 | | 5.6 | | 7.4 |
| 1. Maritime Transport and shipbuilding | | | | | | | | | | | | |
| 1.1 Deep-sea shipping | 3.1 | 11.7 | 10.6 | 11.2 | 14.9 | 11.3 | 6.7 | 4.9 | 2.3 | 3.6 | | 10.1 |
| 1.2 Short-sea shipping (incl. Ro-Ro) | 3.1 | 11.7 | 10.6 | 11.2 | 14.9 | 11.3 | 6.7 | 4.9 | 2.3 | 3.6 | | 10.1 |
| 1.3 Passenger ferry services | 3.0 | 11.7 | 10.7 | 11.1 | 16.7 | 10.8 | 6.9 | 8.3 | | 4.4 | | 10.2 |
| 1.4 Inland waterway transport | 3.4 | 11.6 | 10.6 | 12.7 | 14.3 | 11.6 | 7.5 | 5.7 | 1.8 | 3.4 | | 11.1 |
| 2. Food, nutrition, health and eco-system services | | | | | | | | | | | | |
| 2.1 Catching fish for human consumption | 2.9 | 14.4 | 1.9 | 5.4 | 5.8 | 8.7 | 10.4 | 27.6 | 7.8 | 1.2 | | 3.4 |
| 2.2 Catching fish for animal feeding | 3.5 | 16.9 | 0.7 | 2.9 | 1.9 | 5.1 | 9.7 | 43.6 | 12.3 | 1.1 | | 1.1 |
| 2.3 Marine aquatic products | | | | | | | | 70.2 | 19.8 | | | 10 |
| 2.4 Blue biotechnology | | | | | | | | | | | | |
| 2.5 Agriculture on saline soils | | | | | | | | | | | | |
| 3. Energy and raw materials | | | | | | | | | | | | |
| 3.1 Offshore oil and gas ⁸³ | 1.9 | 1.3 | 1.3 | 1.6 | 7.2 | 0.7 | 0.8 | 77.3 | 0.0 | 0.5 | | 0.0 |
| 3.2 Offshore wind | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | | |
| 3.3 Ocean renewable energy | | | | | | | n/a | n/a | n/a | | n/a | |
| 3.4 Carbon capture and storage | | n/a | | | | | | n/a | n/a | | | |
| 3.5 Aggregates mining (sand, gravel, etc.) | 2.1 | 9.6 | 10.8 | 8.8 | 15.6 | 6.2 | 20.5 | 4.0 | 6.3 | 4.4 | | 8.9 |
| 3.6 Marine minerals mining | | | | | | | | | | | | |
| 3.7 Securing fresh water supply (desalination) | | | | | 100 | | | | | | | |

⁸² Under 'Others' those regions (and the respective breakdown) in a given EU Member State are listed which are not sea-adjacent. Sources: Business Register and Employment Survey and sources in Annex 1.

⁸³ We assume that the 77.3 % for Oil & Gas for Scotland (NUTS II), belong 100% to the Atlantic

| Sea-basin | North Sea | North Sea | North Sea | North Sea | North Sea | Atlantic Arc | Atlantic Arc | North Sea | Atlantic Arc | Atlantic Arc | Atlantic Arc | |
|---|---|--------------------------|----------------------|------------------------|---------------------------|-------------------|---------------------------|-----------------|-----------------|--------------|-------------------------|----------------------------|
| Regional allocation (in %) that applies to employment and GVA data | North East | Yorkshire, Humber | East Midlands | East of England | South East England | North West | South West England | Scotland | Scotland | Wales | Northern Ireland | Other / Unspecified |
| 4. | Leisure, working and living | | | | | | | | | | | |
| 4.1 | Coastal tourism | 3.3 | 5.8 | 5.1 | 6.0 | 13.6 | 12.0 | 14.0 | 14.3 | 5.6 | | 5.3 |
| 4.2 | Yachting and marinas ⁸⁴ | | | | | 50 | | 50 | | | | |
| 4.3 | Cruise tourism | 0.2 | 2.1 | 0.2 | 8.2 | 37.7 | 4.0 | 6.9 | 20.0 | 12.6 | | 1.4 |
| 5. | Coastal protection | | | | | | | | | | | |
| 5.1 | Protection against flooding and erosion, preventing salt water intrusion, protection of habitats | | | | n/a | | | | | | | |
| 6. | Maritime Monitoring and Surveillance | | | | | | | | | | | |
| 6.1/6.2 | Traceability and security of goods supply chains, prevention and protection against illegal movement of people and goods, | | | | | | | | | | | |
| 6.3 | environmental monitoring | | | | | | | | | | | |

Notes: a) Data refers to shares of employment in 2011 as reported by the Business Register and Employment Survey

b) The BRES does not report for Northern Ireland, so employment percentages are at the Great Britain level rather than the UK

c) Other / unspecified is mostly the West Midlands, which is not considered to be a Maritime region

d) The symbol ✓ represents regions with large shares of employment in the sector, but for which data is unavailable

Some data categories cannot be allocated to West and East Scotland due to lack of available data

⁸⁴ No information on marina geographic distribution was available. They are concentrated in the south of England, although there are marinas in all parts of the UK coast

2. Listing of the 7 largest, fastest growing and most promising marine and maritime economic activities

The following sections are aligned with the methodology of the Blue Growth study, as requested by DG MARE. A list in ranking order of the 7 largest, 7 fastest growing and 7 most promising prospective maritime economic activities at NUTS 0 level is provided. This part of the study relies on statistical information gathered and supplemented with the insights of the sector editor/sector editors and the country editor.

2.1. Listing and ranking the largest marine and maritime economic activities

This subchapter identifies the largest maritime economic activities with a ranking order. On the basis of the scores obtained⁸⁵ in relation to GVA and persons employed, the 7 largest maritime economic activities have been identified as follows:

Table 6 – Listing the 7 largest maritime economic activities in the UK

| Rank | Maritime economic activities | GVA (million EUR) | Employment | Score |
|------|---|----------------------|------------|-------|
| 1. | Offshore oil and gas | 36,364 | 32,867 | 198 |
| 2. | Coastal tourism (England only for GVA, GB for employment) | 4,087 | 329,591 | 185 |
| 3. | Passenger ferry services | 976 | 75,677 | 43 |
| 4. | Short-sea shipping (incl. Ro-Ro) | 3,223 | 47,732 | 40 |
| 5. | Shipbuilding (excl. leisure boats) and ship repair | 2,537 | 38,530 | 32 |
| 6. | Catching fish for human consumption | 654 | 38,826 | 23 |
| 7. | Deep-sea shipping | 1,415 | 13,048 | 14 |

2.2. Ranking order for the 7 fastest growing marine and maritime economic activities over the 3 past years

This subchapter identifies and selects the 7 fastest growing maritime economic activities as emerged **over the past 3 years**. This part of the analysis is essential for forecasting future trends. The analysis entails the aggregation and assessment of quantitative data for the maritime economic activities, applying the same approach as in the previous task on statistical information gathered supplemented with the insights of the sector editors and the country editors where applicable.

⁸⁵ Please refer to Methodological Annex.

Table 7 - Ranking order of the 7 fastest growing maritime economic activities in the UK

| Rank | Maritime economic activities | GVA (CAGR) | Employment (CAGR) | Score |
|------|--|------------|-------------------|-------|
| 1. | Catching fish for animal feeding | 5.2% | -0.2% | |
| 2. | Deep-sea shipping | 4.0% | 7.4% | |
| 3. | Shipbuilding (excl. leisure boats) and ship repair | 3.4% | -2.1% | |
| 4. | Short-sea shipping (incl. Ro-Ro) | 3.4% | 7.4% | |
| 5. | Construction of water projects | 1.7% | -4.7% | |
| 6. | Catching fish for human consumption | 1.5% | -1.1% | |
| 7. | Coastal tourism | 0.6% | 3.6% | |

Most significant marine sectors in the UK are showing declining GVA and employment. The exceptions are offshore wind and the shipping of LNG (a sub-sector of deep sea shipping) and salmon farming. The latter of these is experiencing shrinking employment as processes are automated, although output is increasing. Offshore wind (part of renewable energy) and LNG shipping (part of shipping) are both growing as measured by GVA and employment and are much larger by investment and output than salmon farming.

2.3. Ranking order of the 7 most promising marine and maritime economic activities

This subchapter identifies the most promising economic activities which have a perspective and promising growth potential, where future investments and projects could focus. A two-step approach is taken:

- Table 7 presents the scoring of all maritime economic activities (at NUTS 1 or 0 level) alongside the indicators identified in the initial Blue Growth study.⁸⁶
- Table 8 suggests the ranking order for the 7 most promising maritime economic activities

The identification of the 7 most promising maritime economic activities is a result of expert evaluation, which is based on data and information derived from the previous sections, and combined with a number of key external drivers which will determine their importance in the future⁸⁷.

⁸⁶ Ecorys, Deltares, Océanique Développement, 2012: *Drivers and Scenarios for Sustainable Growth from the Oceans, Seas and Coasts. Blue Growth Final Report. Annex I. Maritime economic activities data.* Available here: <https://webgate.ec.europa.eu/maritimeforum/content/2946>

Table 7 - Future potential of economic activities

| Function | Economic activity | Innovativeness | Competitiveness | Employment | Policy relevance | Spill-over effects | Sustainability | Overall score |
|--|--|----------------|-----------------|------------|------------------|--------------------|----------------|---------------|
| 0. Shipbuilding | 0.1 Shipbuilding(excl. leisure boats) and ship repair | + | 0 | 0 | 0 | + | 0 | 2 |
| | 0.2 Construction of water project | 0 | + | + | 0 | + | 0 | 3 |
| 1. Maritime transport | 1.1 Deep-sea shipping | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1.2 Short-sea shipping (incl. RoRo) | 0 | 0 | - | 0 | 0 | 0 | -1 |
| | 1.3 Passenger ferry services | 0 | 0 | - | 0 | 0 | 0 | -1 |
| | 1.4 Inland waterway transport | 0 | 0 | - | 0 | 0 | 0 | -1 |
| 2. Food, nutrition, health and eco-system services | 2.1 Catching fish for human consumption | 0 | 0 | - | + | - | 0 | -1 |
| | 2.2 Catching fish for animal feeding | 0 | 0 | 0 | 0 | - | - | -2 |
| | 2.3 Marine aquatic products | + | + | - | 0 | - | 0 | +1 |
| | 2.4 Blue Biotechnology | + | + | + | + | + | + | 5 |
| | 2.5 Agriculture on saline soils | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3. Energy and raw materials | 3.1 Offshore oil and gas | + | - | - | 0 | - | - | -3 |
| | 3.2 Offshore wind | + | - | + | + | + | + | 4 |
| | 3.3 Ocean renewable energy (wave, tidal, OTEC, thermal, biofuels, etc.) | + | - | 0 | + | + | + | 3 |
| | 3.4 Carbon capture and storage | + | - | + | + | + | + | 4 |
| | 3.5 Aggregates mining (sand, gravel, etc.) | 0 | 0 | 0 | + | - | 0 | -1 |
| | 3.6 Marine minerals mining | 0 | 0 | 0 | 0 | - | 0 | -2 |
| | 3.7 Securing fresh water supply (desalination) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4. Leisure, working and living | 4.1 Coastal tourism | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 4.2 Yachting and marinas | + | + | 0 | 0 | 0 | 0 | 2 |
| | 4.3 Cruise tourism | + | + | + | 0 | 0 | 0 | 3 |
| 5. Coastal protection | 5.1 Protection against flooding and erosion | 0 | + | 0 | + | + | 0 | 3 |
| | 5.2 Preventing salt water intrusion | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 5.3 Protection of habitats | 0 | 0 | 0 | 0 | + | + | 2 |
| 6. Maritime monitoring and surveillance | 6.1/6.2 Traceability and security of goods supply chains, Prevent and protect against illegal movement of people and goods | 0 | 0 | 0 | + | 0 | 0 | 1 |
| | 6.1 Environmental monitoring | + | 0 | 0 | + | 0 | + | 3 |

The last column summarises the final score in terms of number of positive/negative judgements:

“+” in case positive impact of the economic activities on this indicator;

“-” in case of negative impact;

“0” in case the impact is negligible or no impact;

“0” will have no impact, “-” will have the effect of annulling “+” (e.g.: in the same row: ++++ and – and 0 will give the final score of +++).

“?” will not affect the final score.

Table 8 - Ranking order of the 7 most promising maritime economic activities in the UK

| Rank | Maritime economic activities | Score (applying formula) |
|------|------------------------------|-----------------------------|
| 1. | Blue Biotechnology | 5 |
| 2. | Offshore wind | 4 |
| 3. | Carbon capture and storage | 4 |
| 4. | Cruise tourism | 3 |
| 5. | Construction of ports | 3 |
| 6. | Ocean renewables | 3 |
| 7. | Coastal protection | 3 |

The highly ranked sectors span a mixture of small sectors with potential rapid growth prospects but high risk (uncertainty) and more mature sectors with stable growth performance. The former category includes blue biotechnology, ocean renewable and carbon capture and storage. The latter includes ports, cruise tourism and coastal protection.

Innovativeness, competitiveness and employment

Shipbuilding is innovative: cutting edge technology used in defence ship construction. Employment is secured by long tradition of supplying military ships from within the UK.

Construction of new ports improves competitiveness of industry and there is employment associated with increased trade.

Deep sea shipping is static, coastal and passenger shipping is in decline.

Fishing employment likely to fall as industry consolidates. Technology improving slowly.

Marine aquatic products improving in profitability and innovating using robotics. Investment continuing but employment falling.

Oil and gas production continues to innovate to win harder to reach reserves, but production is in structural decline and costs are rising, so the sector is becoming less competitive.

Wave and tidal renewable energy are innovative but high cost and are small scale.

Carbon capture and storage requires innovation and employment. It is high cost now but in the long run may improve competitiveness.

Aggregates is low in innovation, is static or declining in output and will result in a significant change in UK competitiveness in the future.

Coastal tourism is not possible to evaluate on an innovation score, it is not a major attractor of non-UK tourism and has static employment.

Super-yacht building is showing innovation, competitive success and growth in output.

Cruise tourism is showing product development, competitive success and growth in output and employment.

Coastal protection is not showing . It is necessary infrastructure for maintaining competitiveness. It is not growing.

Maritime monitoring and surveillance is showing innovation in use of remote sensing and other new technologies. It is not a significant area of employment growth nor has it a clear impact on competitiveness.

Relevance to policy

With regard to resources management: fisheries, aggregates mining.

With regard to public funding: blue biotechnology, offshore wind, marine renewables, carbon capture and storage, coastal protection, security of goods, environmental monitoring.

Spillover effects

This considers externalities in the form of economic benefits to other sectors and the environment, and the supply of public goods. Low carbon power brings environmental benefits; new technology offers innovation benefits in related sectors. New infrastructure improves the competitiveness of downstream sectors.

Sustainability

Sustainability is low where resources the activity significantly depletes resources or causes pollution and high where there is a resource improvement or technology enhancement.

3. Identification of the most innovative components of Blue Growth

3.1. Assess the innovation score of the maritime economic activities / sectors

This chapter assesses the innovation scores of each of the maritime economic activities in the country. The innovation indicators are inspired on the EU Innovation Scoreboard which aims to capture the innovation level of a country. The following indicators are included⁸⁸:

| Indicator | Explanation |
|---|--|
| 1. Technological Innovation | number of innovations and publications per MEA to the MEA's GVA |
| 2. Skills absorption | share of higher level education in workforce |
| 3. Employment dynamism of innovative fast-growing firms | the indicator combines an innovation coefficient (as developed by Eurostat) with the number of employees in a fast growing firm (annual growth in employees of >10%) |
| 4. RTD expenditure & company growth | This indicator first identifies the level of R&D spending in relation to GVA/turnover (static analysis) and then links it to the growth in turnover (dynamic analysis) |

If in national sources other innovation indicators are found these are included in table 9.

Wherever available, quantitative scores for each of the maritime economic activity are used. Based on the available information ranking scores which presented that rank/order the level of innovation of the different maritime economic activities (1 = highest rank).

Comment:

The innovation indicators will be further elaborated in the sea basin report and are then intended to be fed back in the country fiche when relevant.

Table 8 – Scoring of the maritime economic activities on innovation criteria

See comment above

⁸⁸ Dependent on data availability

Based on the above quantitative and qualitative information an assessment is made of the 7 most innovative maritime economic activities.

Table 11 - Ranking order of the 7 most innovative maritime economic activities in the UK

| Rank | Maritime economic activities |
|------|------------------------------|
| 1. | ... |
| 2. | ... |
| 3. | ... |
| 4. | |
| 5. | |
| 6. | |
| 7. | |

[this table is to be added in the final version]

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4. Identification and analysis of maritime clusters

This section identifies the key Blue Growth clusters in the United Kingdom and describes their economic activities. Clusters are one of the most notable concepts within economic geography. However they are not always easily to difficult to grasp or to measure as they are not clearly delineated industries or sectors. Clusters can be defined at the level of:

- An end product industry or industries;
- Downstream or channel industries;
- Specialised suppliers;
- Service providers;
- Related industries: those with important shared activities, shared skills, shared technologies, common channels, or common customers;
- Supporting institutions: financial, training and standard setting organisations, research institutions, and trade associations.

In this study, clusters are defined as “a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities (external economies)⁸⁹.”

4.1. Maritime clusters in the UK

Building on the clusters already identified in the Blue growth study⁹⁰ and complemented with cluster identified in the EU Cluster Observatory⁹¹, the following clusters have been selected for the UK. Clusters in the UK are located in multiple sea basins: the Atlantic and the North Sea.

Table 12 – Maritime clusters in the UK⁹²

| | List of the Terms of Reference | Blue Growth study | Longlist of maritime clusters EU Cluster Observatory | Location of the cluster | Maritime economic activities in the cluster |
|----|--------------------------------|---------------------|---|-------------------------------|---|
| UK | | | E Riding and N Lincolnshire | North Sea and English Channel | |
| | Aberdeen | Aberdeen | NE Scotland | North Sea and English Channel | |
| | Scottish West Coast | Scottish West Coast | Highlands and Islands, SW Scotland | Atlantic Arc | Offshore wind, marine aquatic resources, fisheries, ocean |

⁸⁹ Prof. Michael E. Porter, 20120213, MOC2012 (HBS course) Session 5 - final

⁹⁰ In the previous Blue Growth study, these were: Bretagne, Brest, Marseilles, ES: Galician Coast, Barcelona;

⁹¹ The EU Cluster Observatory denotes maritime clusters and tourism clusters.

⁹² This longlist is based on the EU cluster observatory. Besides, additional selection criteria were applied, primarily based on the mix of maritime economic activities. See also separate methodology note provided for the cluster analysis.

| | List of the Terms of Reference | Blue Growth study | Longlist of maritime clusters EU Cluster Observatory | Location of the cluster | Maritime economic activities in the cluster |
|--|--------------------------------|--------------------|---|-------------------------------|--|
| | | | | | renewable energy, blue biotech |
| | South West England | South West England | Dorset and Somerset | Atlantic Arc | Fisheries/Aquaculture, Biotechnology, Renewable Energy, Minerals and Aggregates, Coastal Zone Protection and Development, Ship/(leisure) boat building |
| | | | East Scotland | North Sea and English Channel | |

Shortlist of maritime clusters in the UK for in-depth analysis⁹³

The cluster analysis builds on the regional allocation of economic activities as described under section 1.2. It also aims at assessing the maturity of the cluster (mature, growing or early development). Of the above clusters three clusters are further elaborated to show their specific characteristics:

- South West England
- Scottish West Coast
- North East Scotland (Aberdeen).

4.2. Cluster analysis

The shortlisted and selected clusters (South West England, Scottish West Coast, North East England) are analysed according to the following aspects (table 13):

- Maritime economic activities in the cluster and indicate the mixture and composition of the cluster activities in terms of their development stage (mature, growing, early development);
- Assessment of strengths and weaknesses (feeding in to the overall SWOT analysis on the sea-basin level which will be part of the final report).

In addition to that, the identified clusters should be analysed according to the following indicators (table 14):

⁹³ This selection is based on the longlist compiled through the EU cluster observatory. It has been approved by DG MARE and follows the logic of the request for services.

- Number of students in higher education;
- Number of students in higher education following courses specially designed for employment in the blue economy
- Unemployment rate in the cluster
- On-going research in a given cluster, i.e. number of on-going research programmes and projects in the cluster, regionalised patent & publications data (where available at cluster level), R&D test centres located in the cluster etc.

Table 13 - List and strengths and weaknesses of clusters

| | EU Member State | Maritime economic activities concerned | Status (mature, growing, early development) | Strengths | Weaknesses |
|---------------------|-----------------|---|---|---|--|
| Aberdeen | UK | Oil and gas production | Mature, declining | Offshore engineering and hydrocarbon exploration and production expertise | Remote location |
| Scottish West Coast | UK | Naval shipbuilding, Commercial shipbuilding, Marine aquaculture | Naval shipbuilding mature, stable Marine aquaculture, early, growing | Defence ship technology, car ferries, salmon fisheries | |
| South West England | UK | Tourism, Catching fish for human consumption | Tourism, mature, stable Catching fish, mature, declining | Climate, scenery and beaches Inshore fishing fleet | Cost of transport, small scale of fishing activities |

Table 14 – In-depth analysis of clusters

| | EU Member State | Maritime economic activities concerned | Education policy | | Unemployment rate at cluster level ⁹⁴ (NUTS III or II level) | Ongoing research: main research institutes / companies associated to the clusters |
|--|-----------------|--|------------------------------|--|---|---|
| | | | Number of students in higher | Number of students in higher education | | |
| | | | | | | |

⁹⁴ Where available data exists, this should be provided at NUTS 3 level. However, if not available, a NUTS 2 data are gathered. The breakdown on cluster level will be provided and the rationale provided.

| | | | education | following courses for employment in blue economy | | |
|----------------------------------|----|---|---------------------------------|---|---|---|
| Aberdeen | UK | Oil and gas production | 15,500 (2011/12) | 500 graduates per year to oil, gas and energy sector from Aberdeen University | 7.5% in Scotland East Coast (Eurostat, 2012) | Various international oil companies and independent oil companies, Institute of Energy University of Aberdeen |
| Scottish West Coast | UK | Naval shipbuilding, Commercial shipbuilding, Marine aquaculture | 64,105 (2011/12) ⁹⁵ | No data found | 9.8% in South West Scotland, 4.6% in Highlands and Islands (Eurostat, 2012) | BAE Systems Surface Ships, Ferguson Shipbuilders, Naval Architecture and Marine Engineering University of Strathclyde |
| South West England ⁹⁶ | UK | Tourism, Catching fish for human consumption | 162,600 (2011/12) ⁹⁷ | 2,600 students enrolled in the Marine Institute, Plymouth University | 5.1% in Dorset and Somerset (Eurostat, 2012) | Marine Institute at Plymouth University, Centre for Environment, Fisheries and Aquaculture Science at Brixham |

⁹⁵ University of Glasgow, University of Strathclyde, Glasgow Caledonian University, Glasgow School of Art, figures published by the Higher Education Funding Council

⁹⁶ The cluster has been defined as Dorset and Somerset but Plymouth University, CEFAS Brixham and much of the tourism and fishing activity take place in neighbouring Devon and Cornwall, so these institutions have been included in the table.

⁹⁷ Higher Education Statistics Agency figures for all institutions in South West England

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5. Analysis of measures, policies and strategies to stimulate growth and good practices in the sea-basin

[This section has yet to be completed]

The policy evaluation beneath is carried out at national level - NUTS 0, 1 or regional level NUTS 2 (depending on the individual level on which the maritime policy decision-making competency is residing)⁹⁸

The evaluation assesses policies at national, regional and EU level including those that are perceived to favour sustainable maritime growth. Besides, the rationale on what renders such measures effective will be provided (see table 16), focusing on legal/regulatory or financial measures.

The analysis is comprised of two interlinked analysis:

Table 16 provides an overview of maritime policies (national, regional and EU level) and assesses their impact.

Table 17 concludes with good practices derived from these maritime and generic policies. It identifies examples of good practice in one or more Member States that other countries and regions can follow. IT is completed based on the assessment of the country editor with overall supervision of the core team of the study.

Table 16 – Assessment of maritime and generic policies

| Policy | Objectives | Priorities | Consequences for maritime activities | Impacts on sustainable growth | Investment and funding | Other generic policies with high impact on maritime economic activities |
|----------|------------|------------|--------------------------------------|-------------------------------|------------------------|---|
| Policy 1 | | | | | | |
| Policy 2 | | | | | | |
| ... | | | | | | |

The following evidence indicators to identify successful good practices will be analysed depending on the specific context of the individual good practice identified.⁹⁹ The assessment presents an expert opinion as to how far the targets and the objectives of the particular good practice have been met and in how far those have been met.

Table 17 Assessment of good practices derived

| Good practice | Evidence for impact 1 | Evidence for impact 2 | Evidence for impact 3 | Assessment |
|-----------------|-----------------------|-----------------------|-----------------------|------------|
| Good practice 1 | | | | |
| Good practice 2 | | | | |
| ... | | | | |

⁹⁸ We understand this might differ for specific policies. See also table 3 of this country fiche.

⁹⁹ Provided that data is available to identify indicators of success of the good practice (evidence for impact).

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Annex I – Detailed description of the sources and the methodology on maritime economic activities

The following table refers to section 1.1 Overview of relevant maritime economic activities in a Member State (table 1). It will provide the table with the relevant figures sourced from Eurostat, Official national statistical sources or alternative sources (as indicated by the columns of table 1). Detailed reference regarding the sources of the data will complement the data.

Table 18 – Selection table of the most relevant figures and detailed references

| | | Eurostat | | | Official National Statistical Sources | | | Alternative sources (outside official statistics) | | | Other indicators | | | | |
|---|--|--------------------|------------|---|---------------------------------------|------------|-------------------------|---|------------|--|-------------------|------|--------------------|---------------------------------|-------------------------------------|
| Maritime economic activity | | GVA (EUR, million) | Employment | Source & Reference year | GVA (EUR, million) | Employment | Source & Reference year | GVA (EUR, million) | Employment | Source & Reference year | Enterprises | SMEs | Further indicators | Source & reference year + notes | Split private vs. public allocation |
| 0. Shipbuilding | | | | | | | | | | | | | | | |
| 0.1 | Shipbuilding (excl. leisure boats) and ship repair | 1,995 | 33,925 | Eurostat, 2010 | 2,537 | 38,530 | ONS | 1,395 | 35,000 | The Crown Estate (2008) | | | | | |
| 0.2 | Construction of water projects | 132 | 1,636 | Eurostat, 2010 | 279 | 1,656 | ONS | 267 | 6,200 | The Crown Estate (2008) ¹⁰⁰ | 292 | | | | |
| 1. Maritime transport | | | | | | | | | | | | | | | |
| 1.1 | Deep-sea shipping | 1,415 | 14,370 | Eurostat, 2010 | 1,899 | 13,048 | ONS, DfT (2012) | 3,977 | 28,100 | The Crown Estate (2008) ¹⁰¹ | 647 | | | | |
| 1.2 | Short-sea shipping (incl. Ro-Ro) | 3,223 | 32,744 | Eurostat, 2010 | - | 47,732 | ONS | | | | Included in above | | | | |
| 1.3 | Passenger ferry services | 2,590 | 26,309 | Eurostat, 2010 | 976 | 75,677 | ONS | | | | 539 | | | | |
| 1.4 | Inland waterway transport | 133 | 1,707 | Eurostat, 2010 | 28 | 3,635 | ONS | | | | 171 | | | | |
| 2. Food, nutrition, health and eco-system services | | | | | | | | | | | | | | | |
| 2.1 | Catching fish for human consumption | 1,960 | 43,869 | RC (fishing), Eurostat (fish processing, wholesale & retail), PRODCOM | 654 | 12,400 | ONS, MMO | 945 ¹⁰² | 31,336 | The Crown Estate (2008) | | | | | |

¹⁰⁰ The Crown Estate defines construction to include flood and erosion defences and the construction of offshore wind farms. *The Crown Estate (2008), Socio-economic indicators of marine-related activities in the UK economy, May*

¹⁰¹ The Crown Estate report does not distinguish between different types of shipping, and reports a figure for the year 2004.

¹⁰² Including fish farming, sea fisheries and fish processing

| | | Eurostat | | | Official National Statistical Sources | | | Alternative sources (outside official statistics) | | | Other indicators | | | | |
|------------------------------------|--|--------------------|------------|--|---------------------------------------|------------|-------------------------|---|------------------------|---|------------------|------|--------------------|---------------------------------|-------------------------------------|
| Maritime economic activity | | GVA (EUR, million) | Employment | Source & Reference year | GVA (EUR, million) | Employment | Source & Reference year | GVA (EUR, million) | Employment | Source & Reference year | Enterprises | SMEs | Further indicators | Source & reference year + notes | Split private vs. public allocation |
| | | | | (share of human/animal), 2010 | | | | | | | | | | | |
| 2.2 | Catching fish for animal feeding | 58 | 1,491 | JRC (fishing), PRODCOM (share of human/animal), 2010 | | 32,867 | ONS | | | | | | | | |
| 2.3 | Marine aquatic products | 136 | 1,411 | JRC, 2010 | - | 10,600 | Scottish Government | | | | 48 | | | | |
| 2.4 | Blue biotechnology | | | | | | | | | | | | | | |
| 2.5 | Agriculture on saline soils | | | | | | | | | | | | | | |
| 3. Energy and raw materials | | | | | | | | | | | | | | | |
| 3.1 | Offshore oil and gas | 3,713 | 37,797 | Eurostat, GVA 2010, Employment 2009. | 36,364 | 32,867 | ONS, DECC | 23,219 | 290,000 ¹⁰³ | The Crown Estate (2008) | 1,100 | | | | |
| 3.2 | Offshore wind | | | | | 10,600 | ONS | - | 10,600 | Renewable UK | | | | | |
| 3.3 | Ocean renewable energy | | | | | | | 12 ¹⁰⁴ | 50 | The Crown Estate (2008) | | | | | |
| 3.4 | Carbon capture and storage | | | | | | | | | | | | | | |
| 3.5 | Aggregates mining (sand, gravel, etc.) | 23 | 414 | Eurostat, 2010 | | 1,030 | | - | 1,150 | British Geological Survey/BM APA (2007) | | | | | |

¹⁰³ The large difference between these figures is likely because the Crown Estate estimate includes the supply chain.

¹⁰⁴ The renewable energy figures are for the year 2005-06, and cover offshore wind, tidal current and wave energy of which the great majority of activity is in offshore wind. The figures will have increased many-fold since these data were collected in 2005-06.

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| | | Eurostat | | | Official National Statistical Sources | | | Alternative sources (outside official statistics) | | | Other indicators | | | | |
|---------------------------------------|--|--------------------|------------|-------------------------------|---------------------------------------|------------|-------------------------|---|-----------------------|---------------------------|------------------|------|--------------------|---------------------------------|-------------------------------------|
| Maritime economic activity | | GVA (EUR, million) | Employment | Source & Reference year | GVA (EUR, million) | Employment | Source & Reference year | GVA (EUR, million) | Employment | Source & Reference year | Enterprises | SMEs | Further indicators | Source & reference year + notes | Split private vs. public allocation |
| | | | | | | | | 133 | 1,670 | The Crown Estate (2008) | | | | | |
| 3.6 | Marine minerals mining | | | | 0 | 0 | - | | | | | | | | |
| 3.7 | Securing fresh water supply (desalination) | | | | | | | 0 | 0 | Global Water Insights | 1 | | | | |
| 4. Leisure, working and living | | | | | | | | | | | | | | | |
| 4.1 | Coastal tourism | 8,613 | 296,404 | Eurostat, 2010 | | 329,591 | ONS | 4,087 | 210,000 | Beatty et al. | | | | | |
| | | | | | | | | 2,644 | 90,000 | The Crown Estate (2008) | | | | | |
| 4.2 | Yachting and marinas | | | | | | | 28 | 1,400 | British Marine Federation | | | | | |
| | | | | | | | | 220 | 14,200 ¹⁰⁵ | The Crown Estate (2008) | | | | | |
| 4.3 | Cruise tourism | 395 | 4,017 | (low estimate) Eurostat, 2010 | | 4,017 | ONS | 1,027 | 10,470 | The Crown Estate (2008) | | | | | |
| 5. Coastal protection | | | | | | | | | | | | | | | |
| 5.1 | Protection against flooding and erosion, preventing salt water intrusion, protection of habitats | | | | | | | | | | | | | | |

¹⁰⁵ The large discrepancy between the Crown Estate figure and the British Marine Foundation figure is likely a result of varying definitions of employment directly or indirectly within this sector.

| | | Eurostat | | | Official National Statistical Sources | | | Alternative sources (outside official statistics) | | | Other indicators | | | | |
|--|---|-----------------------|------------|-------------------------|---------------------------------------|------------|-------------------------|---|------------|-------------------------|------------------|------|--------------------|---------------------------------|-------------------------------------|
| Maritime economic activity | | GVA (EUR, million) | Employment | Source & Reference year | GVA (EUR, million) | Employment | Source & Reference year | GVA (EUR, million) | Employment | Source & Reference year | Enterprises | SMEs | Further indicators | Source & reference year + notes | Split private vs. public allocation |
| 6. Maritime monitoring and surveillance | | | | | | | | | | | | | | | |
| 6.1/ 6.2 | Traceability and security of goods supply chains, prevention and protection against illegal movement of people and goods, | | | | | | | | | | | | | | |
| 6.3 | environmental monitoring | | | | | | | 564 | 16,035 | The Crown Estate (2008) | | | | | |
| Total | | | | | | | | | | | | | | | |

Note: Some Crown Estate figures are significantly different to other sources. In some cases this is due to a slightly different definition of the sector, for example in fishing, and in other cases it is the result of differing methodologies for estimates, in particular when looking at employment figures, and whether direct employment or employment generated by an industry is considered. The Crown Estate figures are for the years 2004, 2005 or 2006.

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