

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

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## COUNTRY PAPER – FINAL *UNITED KINGDOM*

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## 0. Preface

This country paper 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.

Brussels, March 2014



# 1. General overview

## 1.1. Country overview:

The population of the UK was 62.5 m at the end of 2011 in 23.4 m households.<sup>1</sup> Total employment was 29.4 m in 2012 and unemployment was 7.8 per cent in the last quarter of 2012.<sup>2</sup> Twenty per cent of the population is aged over 65.

The GDP of the UK in 2012 was € 1.9 trillion, which equated to € 30 500 per capita. Service industries accounted for 73 per cent of output in 2010.<sup>3</sup> 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.

## 1.2. 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, Cardiff in Wales and in England Liverpool, Bristol and Southampton. The UK has 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 mainly based in Peterhead and Fraserburgh 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.

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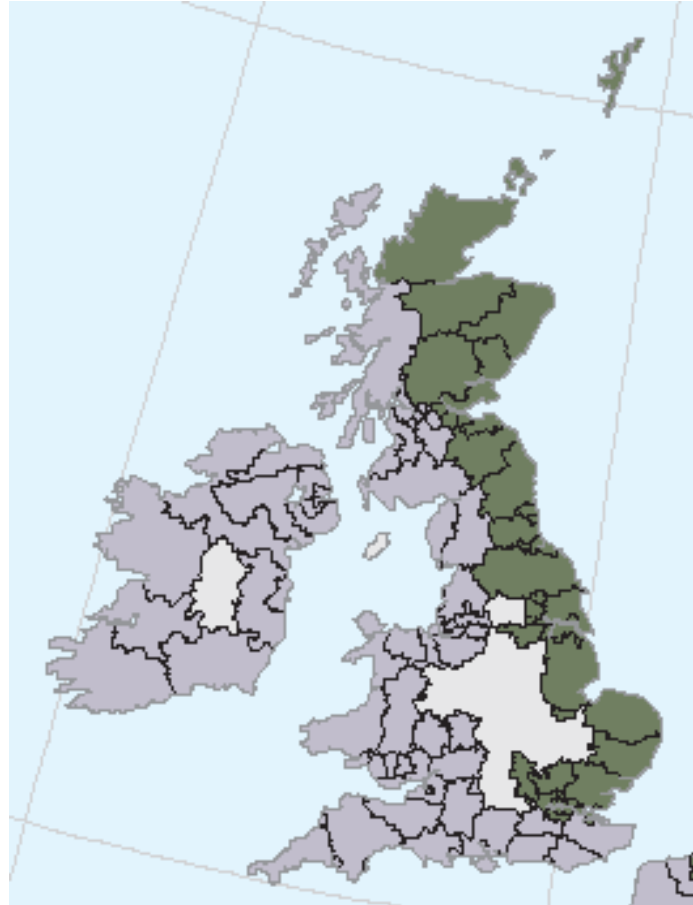
<sup>1</sup> Eurostat

<sup>2</sup> Eurostat

<sup>3</sup> UK Office for National Statistics National Accounts

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 1.1 Coastal regions of the UK and Republic of Ireland**



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

Landscan reports that 29.5% of the United Kingdom's population, i.e. 18.8 m people, are living within 10 km from the sea.<sup>4</sup>

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<sup>4</sup> LandScan™ Global Population Database, 2006. % share of coastal population based on 2006 data. To calculate the total number of coastal population, we assume that the share of inhabitants living within 10 km from the coast remained equal from 2006 to 2012 and apply the 2006 % share to the 2012 population data of 63,695,687 (United Kingdom, 2012 figures, based on Eurostat).



## 2. Maritime economic activities

### 2.1. 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 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.

#### 2.1.1. Quantitative overview of maritime economic activities

Table 2.1 provides an overview of the most reliable data for each of the maritime economic activities<sup>5</sup>. 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.

**Table 2.1** Quantitative overview of maritime activities in the United Kingdom

Maritime economic activity		GVA (€ m)	Employment	Number of enterprises	Source & Reference year
0.a	Shipbuilding and repair	2 537	38 530	-	ONS
0.b	Construction of water projects	279	1 656	292	ONS
1.a	Deep-sea shipping	1 415	13 048	647	Eurostat, 2010 & ONS for employment
1.b	Short-sea shipping	3 223	47 732	-	Eurostat, 2010 & ONS for employment
1.c	Passenger ferry services	976	75 677	539	ONS
1.d	Inland waterway transport	28	3 635	171	ONS
2.a	Fisheries for human consumption	654	43 869	-	ONS, MMO
2.b	Fisheries for animal consumption	58	1 491	-	JRC (fishing), PRODCOM (share of human/animal), 2010
2.c	Marine aquaculture	136	1 411	48 <sup>6</sup>	JRC, 2010
2.d	Blue biotechnology	-	-	-	-
2.e	Agriculture on saline soils	-	-	-	-

<sup>5</sup> 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.

<sup>6</sup> The 48 aquaculture industries cover around 254 active sites in Scotland and are of great importance for employment opportunities in rural communities.

	Maritime economic activity	GVA (€ m)	Employment	Number of enterprises	Source & Reference year
3.a	Offshore oil and gas	36 364 <sup>7</sup>	32 867	1 100	ONS, DECC
3.b	Offshore wind	n.a.	10,600	n.a.	RenewableUK
3.c	Ocean renewable energy	-	-	-	-
3.d	Carbon capture and storage	-	-	-	-
3.e	Mining (sand, gravel, etc.)	23	1 030	-	Eurostat, 2010 & ONS for employment
3.f	Marine minerals mining	0	0	-	-
3.g	Desalination	0	0	-	Global Water Insights
4.a	Coastal tourism (accommodation) (England only for GVA, GB for employment)	4 087	329 591	-	Beatty et al. <sup>8</sup> & ONS for employment
4.b	Yachting and marinas	28	1 400	-	British Marine Federation
4.c	Cruise tourism	395	4 017	-	(low estimate) Eurostat, 2010
5.a	Coastal protection	-	-	-	-
6.a/ 6.b	Maritime surveillance	-	-	-	-
6.c	Environmental monitoring	-	-	-	-

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 6<sup>th</sup> August 2013.

## 2.1.2. 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.<sup>9</sup> 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 bn per annum of which the total value of the destroyer programme alone is near €6.6 bn.<sup>10</sup>

The UK ship building industry focuses on military ships such as submarines, destroyers, aircraft carriers and other vessels for the Royal Navy.<sup>11</sup> 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,

<sup>7</sup> Figure based on ONS published data for 2011: (see for example <http://www.ons.gov.uk/ons/rel/input-output/input-output-supply-and-use-tables/2013-edition/bb13-detailed-suts-1997-2011.xls>). Data is for the entire UK oil and gas extraction sector as well as other supporting services.

<sup>8</sup> 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.

<sup>9</sup> *House of Commons Scottish Affairs Committee (2013), The Referendum on Separation for Scotland: Separation shuts shipyards, HC892, January*

<sup>10</sup> 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

<sup>11</sup> BAE Systems

guaranteeing its future well into the next decade. Rosyth will get aircraft carrier refit work over 50 years.<sup>12</sup>

In 2012, the UK Government awarded £700 m 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 bn, of which £14 to 14 bn 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.<sup>13</sup>

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 m 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 bn in 2011/12, employing 31 000 full time equivalents in around 4,200 businesses. Gross value added was €1 082 m. 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.<sup>14</sup> The sector is strongest in the south east and south west of England. Of these total figures, €1.3 bn 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 m per year and over 3 600 employees.<sup>15</sup> There is some overlap between the construction of naval and commercial ships, with some builders of fishing 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 bn in value added to UK Gross Domestic Product and over €2.4 bn in tax receipts.<sup>16</sup> The UK has 51 major and 59 minor ports. UK ports handled 320 m tonnes of inbound freight and 181 m tonnes of outbound freight in 2012. Inbound tonnes have remained stable but outbound tonnage has fallen by a quarter over the last ten years.<sup>17</sup> Total tonnage is now at the same level seen 20 years ago.<sup>18</sup> While total port tonnage fell by 4 per cent, the minor ports experienced a faster decline, of 8 per cent. Grimsby and Immingham is the largest port, handling 60 m tonnes in 2012, followed by London, Milford Haven and Southampton. Dover was the busiest unitised port, handling 4.3 m 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.<sup>19</sup>

<sup>12</sup> House of Commons Scottish Affairs Committee (2013)

<sup>13</sup> House of Commons Library, (2013), *Update on the Trident Successor Programme, August*

<sup>14</sup> British Marine Federation (2012), *UK Leisure, Superyacht and Small Commercial Marine Industry Key Performance Indicators 2011/12*

<sup>15</sup> UK Marine Industries Alliance (not dated), *A strategy for growth for the UK Marine Industries.*

<sup>16</sup> Oxford Economics (2013), *The economic impact of the UK Maritime Services Sector: Ports, February*

<sup>17</sup> Inbound tonnage has in fact peaked in 2006 at 364.6 m tonnes then steadily declined to reach its 2002 level in 2012

<sup>18</sup> Department for Transport (2013), *Port Freight Statistics: Provisional Annual 2012, June.*

<sup>19</sup> Department for Transport (2011), *National Policy Statement for Ports, October*

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 m tonnes per year, and is one of the largest by capacity in Europe<sup>20</sup>. The other major facility is the South Hook facility at Milford Haven, which opened in 2009, and is capable of bringing 15.6 m tonnes per year of gas into the UK. Each is able to supply 20 per cent of the UK's forecast gas demand.<sup>21</sup> Other terminals include the Dragon Project in Milford Haven with capacity of 8.8 m tonnes per year and Teesport LNG with 3.0 m tonnes per year.

Investment in UK ports covered by the UK Major Ports Group, representing 70 per cent of tonnage handled, was €1.68 bn, 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 bn and include a new container port, London Gateway, with a cost of €1.8 bn<sup>22</sup>. London Gateway will have capacity for 3.5 TEUs per year.<sup>23</sup>

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

Felixtowe: + 2 mteu  
Harwich: +1.7 mteu  
London Gateway: +3.5 mteu  
Teesport: +1.5 mteu  
Liverpool: +0.6 mteu  
Bristol: +1.5 mteu  
Southampton: +1.7 mteu

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 (94 m tonnes). Only 11 per cent was lift on lift off (lo-lo) (55 m tonnes). 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).<sup>24</sup>

### **Deep sea shipping**

Deep sea shipping is the third most valuable sector of water transport in the UK, contributed €1.42 bn of gross value added and €5.5 bn 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. Total tonnage for the sector stood at 117 m tonnes in 2012.

Liquid bulk tonnage is the largest component, and it is almost all oil, such that 36 per cent of all deep sea freight tonnage was liquid bulk in 2012. Dry bulk was 33 per cent, roll on roll of (ro-ro) was 1 per cent (1.5 m tonnes) and 26 per cent was lift on lift off (lo-lo) (30 m tonnes).

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<sup>20</sup> Grain LNG

<sup>21</sup> South Hook LNG

<sup>22</sup> Oxford Economics (2013), *Investment and productivity growth at UKMPG ports, June*

<sup>23</sup> DP World

<sup>24</sup> Department for Transport (2013), *Port Freight Statistics: final figures 2012, June*

In 2012, UK companies directly owned 21.6 m dwt, while UK companies had a controlling interest (parent ownership) in 32.9 m 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.<sup>25</sup>

A long-run forecast of LNG traffic, made in 2007, suggested a rapid increase from 7.8 m tonnes of liquefied gas (LPG and LNG) in 2005 to 41 m 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 m tonnes in 2005 to 90.2 m 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 m tonnes in 2005 to 133 m 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.<sup>26</sup> 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.

### ***Domestic and 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 30 bn tonne kilometres per year.<sup>27</sup> Traffic (tonne kilometres) fell 8 per cent between 2001 and 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. 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 m tonnes in 2001 to around 20 m tonnes in 2011. This is primarily a consequence of reduced landings from rigs, which has fallen from 19.6 m tonnes in 2004 to 7.2 m tonnes in 2011. The largest one-port category is now dredged aggregates, which was 13.8 m tonnes in 2004 and has fallen slightly to 11.8 m tonnes in 2011.<sup>28</sup>

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<sup>25</sup> Department for Transport (2013), *Shipping Fleet Statistics 2012, September*

<sup>26</sup> MDS Transmodal Limited (2007), *Update of UK port demand forecasts to 2030 & economic value of transshipment study*

<sup>27</sup> Department for Transport (2012), *Domestic Waterborne Freight 2011*

<sup>28</sup> Department for Transport (2011), *One-port traffic, goods lifted 2004-2011*

Figures from the Crown Estate suggest that 9.4 m tonnes of aggregates were dredged in England and 0.7 m tonnes in Wales.<sup>29</sup>

Short sea traffic is the largest water transport sector in the UK by tonnage. In 2012 it handled 269 m tonnes of freight. Again liquid bulk tonnage was the largest component and was 43 per cent, Dry bulk was 18 per cent, roll on roll of (ro-ro) was 27 per cent (71.7 m tonnes) and only 8 per cent was lift on lift off (lo-lo) (21 m tonnes).

### **Passenger ferry**

International passenger numbers increased almost every year from 1950, 4.5 m, to 1994, 37 m, but have subsequently fallen steadily. They fell from 29.3 m in 2002 to 21.4 m in 2012 and are expected to decline further, due to competition from aviation (in particular low cost carriers) and the Channel Tunnel.<sup>30</sup> Most passenger ferry traffic is between the UK and continental Europe with smaller amounts between the Britain and Ireland. The busiest port was Dover with 11.9 m passengers in 2012. The next largest ports were Holyhead and Portsmouth, with 2 m each. In comparison, the Channel Tunnel handled 17 m passengers and in 2010, UK airports handled 172 m 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 years<sup>31</sup>. 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 bn in 2007/08 to €3.3 bn in 2012/13.<sup>32</sup> 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.<sup>33</sup>

### **Inland waterway transport**

In 2011 traffic on UK inland waters was stable compared to 2010, with 43.9 m tonnes lifted and 1.4 bn tonne-kilometres moved.<sup>34</sup> However, there has been a long term slow decline from above 50 m tonnes in 2001. Around 8 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 6.4 m tonnes is coastwise sea-going traffic, but the remainder, around 30 m 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 17 m tonnes, and reported 5.6 m tonnes of aggregates landed. Next busiest was the River Forth at 8 m tonnes, and the Manchester Ship Canal and River Mersey. Only 11 per cent of the River Thames traffic is non-seagoing and other waterways carry much smaller amounts of non-seagoing traffic.

<sup>29</sup> *The Crown Estate (2012), Marine Aggregates The Crown Estate Licences Summary of Statistics 2012.*

<sup>30</sup> *Department for Transport (2013), UK international sea passenger movements 1950-2012, May*

<sup>31</sup> *David MacBrayne Group (2012), Group Annual Report and Consolidated Financial Statements*

<sup>32</sup> *IBIS World Sea & Coastal Passenger Water Transport in the UK, H50.100, March*

<sup>33</sup> *House of Commons Transport Committee (2012), Sulphur emissions by ships, Sixteenth report of session 2010-12, February.*

<sup>34</sup> *DfT 2012*

Again petroleum and petroleum products is the main liquid bulk item, 13 m tonnes of which 11.1 m tonnes was seagoing foreign traffic. 15.2 m tonnes was dry bulk and 9.1 m tonnes of unitised traffic (containers). Unitised traffic is the only category to have increased between 2001 and 2011, rising from 8.7 m tonnes to 9 m tonnes and it is centred on Thames and Kent. However the rise was not uniform, peaking in 2005 at 13 m tonnes. Liquid bulk, centred on Scotland East Coast and Thames and Kent has declines in recent years. Finally dry bulk, centred on Thames and Kent, has increases since 2009.

## **Food, nutrition and health**

### ***Fisheries for human consumption***

The UK has 6 400 fishing vessels in 2012, compared with 7 700 a decade earlier, a reduction of 17 per cent. The number of fishermen fell in proportion, to 12 400.<sup>35</sup> If all downstream dependent employment is included, the number of jobs is around 30 000 – 40 000.<sup>36</sup> Of these vessels, 5 000 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 27 per cent and power has fallen by 24 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.

627 000 tonnes of fish and shellfish were landed by UK vessels into the UK and abroad in 2012 with a value of €900 m. This is a decline from over 700 000 tonnes in 2001, but an increase in value from just under €721 m 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 2012 compared with 2001, where they accounted for 50 per cent of value of landings. Demersal landings by weight fell by 40 per cent over the period. Shellfish landings rose by 13 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 58 000 tonnes in 2012. This reflects a 40 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 67 per cent since 1995 and haddock down 60 per cent. Together, this has cut 103 000 tonnes from landings. Mackerel and herring are the two key pelagic species. Mackerel landings have fallen around 26 per cent since 1995, to 18 000 tonnes and herring landings have fallen 23 per cent since 1995, to around 90 000 tonnes. There has been a small increase in nephrops landings, reflecting the changing food webs as whitefish 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 2012, but most of the fishermen crew the smaller English boats. Thus there are 6 900 English fishermen and 4 700 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 43 per cent by quantity and 33 per cent by value of all landings by UK vessels into the UK.

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<sup>35</sup> Office for National Statistics

<sup>36</sup> Crown Estate (2008) estimates 31,000; Eurostat estimates 44,000.



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 750 000 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.<sup>37</sup>

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

### ***Fisheries 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.<sup>38</sup>

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 from a variety of species and the rest is sourced outside the EU.<sup>39</sup> 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.

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<sup>37</sup> *Marine Management Organisation (2012), UK Sea Fisheries Statistics 2011*

<sup>38</sup> *Seafish (2011), Fishmeal and fish oil figures, October*

<sup>39</sup> *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*



### Marine aquaculture

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 which is mainly exported. Total revenue could reach €721 m 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.<sup>40</sup>

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The Scottish Government (2011) estimates the output of marine aquaculture to be €522 m per year, of which €495 m 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.<sup>42</sup>

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 m in 2012.<sup>43</sup>

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.<sup>44</sup> When shellfish is added to production of salmon, the total direct employment rises to around 1 400.<sup>45</sup> An estimate of the total employment effect, including dependent jobs in the supply chain is around 10 600.<sup>46</sup>

### 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.<sup>47</sup> Nor is the word to be found in the industry's strategy paper.<sup>48</sup> The word 'marine' cannot be found in the Biotechnology and Biological Sciences Research Council strategic plan or its delivery plan. The word is also absent from the UK's strategy for life sciences.<sup>49</sup> Nor is biotechnology prominent in discussion of marine science in Parliament.<sup>50</sup>

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<sup>40</sup> IBIS World (2013), *Marine Aquaculture in the UK*, March

<sup>41</sup> In 2006, 6 per cent of aquaculture production by weight was in Wales. DEFRA (2009) *A strategic review of the potential for aquaculture to contribute to the future security of food and non-food products and services in the UK and specifically England*, April

<sup>42</sup> Scottish Government website, accessed 3<sup>rd</sup> August 2013

<sup>43</sup> Scottish Government (2013), *Marine Scotland Science: Scottish Shellfish Farm Production Survey*, 2012 Report, May

<sup>44</sup> The Scottish Government (2012), *Scottish Fish Farm Production Survey*

<sup>45</sup> JRC

<sup>46</sup> Crown Estate (2008)

<sup>47</sup> HM Government, Scottish Government, Welsh Assembly Government, Northern Ireland Executive (2010), *UK Marine Science Strategy*

<sup>48</sup> UK Marine Industries Alliance (2011), *A strategy for growth for the UK Marine Industries*

<sup>49</sup> 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

<sup>50</sup> House of Commons Science and Technology Select Committee (2007), *Investigating the Oceans: Tenth Report of Session 2006-07*, October

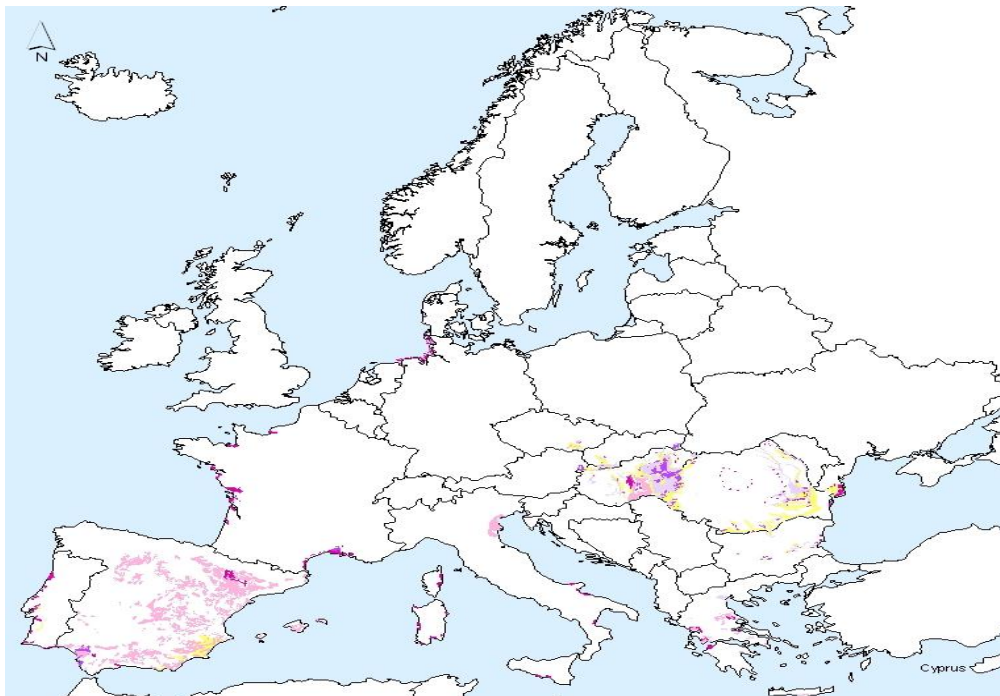
Nevertheless, the UK does maintain academic centres of excellence and also harbours a number of commercial marine biotechnology firms. Descriptions of some of the centres of excellence as described in 2009 by a government department are reproduced below:

- 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 deep-sea technologies.<sup>51</sup>

#### **Agriculture on saline soils**

According to the Joint Research Centre data, there are no saline and sodic soils in the UK, see map in Figure 2.1. Some are in coastal areas such as salt marshes used for sheep.

**Figure 2.1** Saline and sodic areas in the EU



Note: Saline and sodic areas are at various level are indicated on the ma

Source: European Commission Joint Research Centre

<sup>51</sup> Department for Business, Enterprise and Regulatory Reform (2009), *Maximising UK Opportunities from Industrial Biotechnology in a Low Carbon Economy, IB 2025, May*

## Energy and seabed 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 bn in 2012, probably increasing to €16.8 bn in 2013. It supplies almost half of the UK's primary energy needs and boosts the balance of payments by €60 bn 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.<sup>52</sup>

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 bn in 2011.<sup>53</sup>

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 m tonnes of oil equivalent. In the years 1965-70 it was 115 m 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 m toe and natural gas by a similar fraction to around 50 m 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<sup>54</sup>.

Tax revenues from UK oil and gas production in 2012/13 were €7.81 bn, comprising €2 bn of production taxes and €5.8 bn 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.<sup>55</sup>

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<sup>52</sup> Source: <http://www.oilandgasuk.co.uk/employment.cfm>

<sup>53</sup> HM Government (2013), *UK Oil and Gas: Business and Government Action*, March

<sup>54</sup> DECC (2012), *Digest of United Kingdom Energy Statistics 2012*, July

<sup>55</sup> HM Revenue and Customs (2013), *Statistics of Government revenues from UK oil and gas production*, June.

## Offshore wind

Offshore wind output increased by 2,337 GWh to 7,463 GWh and capacity by 1.3 GW to a total of 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.<sup>56</sup>

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 bn of gross value added to the UK economy excluding exports and support over 30 000 full time equivalent UK jobs<sup>57</sup>.

The government is contributing around €24 m over several years to promote development of the supply chain. The UK Government has also published the limits on annual spending on low carbon generation as agreed in the Levy Control Framework up to 2020/21, as well as potential 2020 deployment sensitivities for each renewable technology. For offshore wind, the potential 2020 deployment set out is 8 to 16 GW dependent on a range of factors including industry cost reductions over time. The UK Government also included a forward look to 2030. This provided indicative illustrations of offshore wind deployment through to 2030 under a number of different scenarios.<sup>58</sup> There are now nearly 30 vessels operating from the Port of Grimsby servicing offshore wind farms. The Low Carbon Innovation Coordination Group are providing over £100 m of targeted financial support to develop innovative offshore wind technologies between 2011 and 2015. These technologies will play a key role in reducing the cost of offshore wind energy and knowledge development in the sector. This support includes:

- The Research Council's SuperGen Wind programme – a consortium with seven research partners and the active support of 18 industrial partners including wind farm operators, manufacturers and consultants. The SuperGen wind programme is currently in the process of being renewed for a third phase, which would see a further £3M investment over 5 years. We expect to be able to announce the results of this process by late October/early November;
- The Energy Technologies Institute's Offshore Wind programme which includes projects seeking to develop a technology platform to build blades in excess of 100 m, a FEED study into the design of an offshore wind floating platform system demonstrator suitable for use in deeper waters and a test rig capable of testing complete drive trains and nacelles up to 15MW aimed at improving the reliability of offshore wind turbines;
- DECC and TSB's Offshore Wind Component Technologies Development and Demonstration Scheme aimed at supporting testing and demonstration of devices and innovation in component technologies for all sub-areas of large offshore wind systems. DECC has run 4 calls of the Components Scheme, including projects looking at: wind turbine generators and drive trains; concrete, steel and floating foundations; fabrication techniques; offshore access and subsea cabling. The Scheme has a total budget for capital grants of up to £15 m;
- In May, DECC announced funding of £792 000, for the Offshore Wind Structural Lifecycle Industry Collaboration (SLIC) project. The SLIC project has been established by a group of ten offshore wind operators working in close cooperation with certification authorities with the aim of commissioning an offshore wind-specific piece of research to inform the design of future wind farms, and the optimisation of existing offshore projects;
- The Carbon Trust Offshore Wind Accelerator;

<sup>56</sup> DECC (2013), *Renewable energy in 2012*.

<sup>57</sup> 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.'

<sup>58</sup> Potential 2020 deployment sensitivities are dependent on industry cost reductions over time and the figures are not Government forecasts

- TSB's programme aimed at developing an innovative UK supply chain.

In addition, the UK Government has confirmed £46 m of funding to the Offshore Renewable Energy Catapult over its first five years of operation to integrate key players and act as a hub to galvanise all UK innovation work streams and test assets. The Catapult has been set up under the leadership of Chairman Colin Hood and Chief Executive Andrew Jamieson. It is headquartered in Glasgow and will build up a strong team of engineering and business support services over the next two to three years. They have set up effective Industry and Research Advisory Groups, with strong representation from business and academia respectively, and are engaging with SMEs through a variety of direct and indirect channels.

Working in close cooperation with major stakeholders and UK research facilities, four pilot projects are underway in the fields of cables, standards (both marine and offshore wind), a Marine Farm Accelerator and reliability; they are expected to report initial findings in late 2013 ahead of the announcement of future projects. For more information see <https://ore.catapult.org.uk/>. The UK Government is also participating in investment, with its Green Investment Bank planning to co-invest €1.2 bn in offshore wind by March 2015.<sup>59</sup>

The total number directly employed in offshore wind and marine renewable energy was around 10 600 in 2010.<sup>60</sup>

### ***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 demand<sup>61</sup>. 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.

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<sup>59</sup> HM Government (2013), *Offshore Wind Industrial Strategy: Business and Government Action*, August

<sup>60</sup> RenewableUK (2011), *Working for a Green Britain*, Volume 2, July

<sup>61</sup> 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)

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.<sup>62</sup>

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 m and the Scottish Government has allocated a further €21.6 m. A Parliamentary committee regarded these sums as too low given the costs of deploying test arrays.<sup>63</sup>

### **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 in 2015 on the construction of up to two projects. It has set aside up to €1.2 bn in capital funding and has legislated to allow operational support costs to be recovered from electricity consumers through a levy. It has also supported applications from these projects for the European NER300 second round funding.

The UK has a €150 m 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 m is fundamental research, €32 m technology components and €52 m 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.<sup>64</sup>

### **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.

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<sup>62</sup> DECC (2011), *UK Renewable Energy Roadmap*, July

<sup>63</sup> House of Commons Energy and Climate Change Committee (2012), *The Future of Marine Renewables in the UK*, Eleventh Report, February

<sup>64</sup> 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



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.<sup>65</sup>

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 m in 2006. The fleet of 28 dredgers with a total hopper capacity of 112 000 tonnes and a replacement value of around €1.2 bn. The larger vessels are 4 000 – 8 000 tonne capacity and will produce 1.0 m 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 km<sup>2</sup>, but 90 per cent of dredging took place within an area of 49 km<sup>2</sup>. In 2005 the declared primary reserve of permitted coarse marine aggregate was 114 m tonnes.<sup>66</sup>

**Table 2.2** 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
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: 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 Ml 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 Ml per day desalination plant for the Isle of Wight as an option in its long term water resources management plant. This plant would not come on line until 2032.

<sup>65</sup> 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*

<sup>66</sup> 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.*

## Leisure and tourism

### *Coastal tourism (accommodation)*

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 m and total expenditure was €5.8 bn, of which 4.6 bn was in England, €0.3 bn in Scotland and €0.84 bn in Wales. There was an additional 24 m visits which were primarily to another type of destination but also took in a seaside or coastal place.<sup>67</sup>

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.<sup>68</sup>

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 58 seaside towns where more than 1 000 jobs are supported by Coastal tourism (accommodation). In some places, notably Newquay and St Ives in the south west, the dependency of local employment on Coastal tourism (accommodation) 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 cities<sup>69</sup>.

Overall perhaps 210 000 jobs are directly supported by seaside tourism in England and Wales.<sup>70</sup> The Official national statistics of the UK<sup>71</sup> indicate a total contribution of 329 591 jobs to the economy. 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.<sup>72</sup> 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 (accommodation) 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 m for Greater Blackpool, €310 m for Greater Brighton and €213 m for Greater Bournemouth, which together with other places, give a total figure of €4.1 bn 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.

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<sup>67</sup> VisitEngland, VisitScotland, Visit Wales (2013), *The GB Day Visitor Statistics 2012, April*

<sup>68</sup> Arkenford (2012), *Watersports Participation Survey 2012: Executive Summary*

<sup>69</sup> House of Commons, *Communities and Local Government Committee (2007), Coastal Towns*

<sup>70</sup> Beatty et al (2010)

<sup>71</sup> Compare also table 1 figure on employment

<sup>72</sup> Eurostat and UK Office for National Statistics



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.<sup>73</sup>

### **Yachting and marinas**

Coastal marinas had revenues of €118 m in 2011/12 and employed 1 400 people, excluding those employed in the building of boats (detailed elsewhere in this report).<sup>74</sup> There are 227 UK inland marinas accounting for 27 700 offline berths. The core revenue is €47 m, employing almost 900 people. The gross value added is around €23 m. 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.<sup>75</sup> 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 m 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.<sup>76</sup> 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 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.<sup>77</sup> Direct employment on cruise ships is around 4 000 jobs<sup>78</sup>. The number of people employed by cruise lines in the UK is higher, at 10 500 jobs<sup>79</sup>.

### **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<sup>80</sup>.

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 bn from coastal flooding around the UK, €90 bn from flooding in London and €12 bn from coastal erosion across the UK.<sup>81</sup> In England, the Environment Agency has reserved funding for 152 coastal protection and flooding investments totalling €1.2 bn to commence in 2013/14, and a further €511 m 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

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<sup>73</sup> 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

<sup>74</sup> British Marine Federation (not dated), *UK Leisure, Superyacht and Small Commercial Marine Industry: Key Performance Indicators 2011/12*

<sup>75</sup> British Marine Federation, *Economic Benefits of Inland Marinas in the UK*

<sup>76</sup> This sentence is understood to be about people visiting the UK, while all other text here is about UK citizens cruising to elsewhere.

<sup>77</sup> Passenger Shipping Association (2013), *The Cruise Review*, March

<sup>78</sup> Eurostat and UK Office for National Statistics

<sup>79</sup> Crown Estate (2008) reporting figures from European Cruise Council

<sup>80</sup> Defra, Environment Agency (2011), *Understanding the risks, empowering communities, building resilience: The national flood and coastal erosion risk management strategy for England*.

<sup>81</sup> Parliamentary Office of Science and Technology, *Coastal Management*, Postnote no 342, October

and defences against river flooding. A further €1 021 m of projects have been identified for the period commencing 2018/19.<sup>82</sup>

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.<sup>83</sup> 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.<sup>84</sup>

In 2011/12 the Welsh Government committed €44 m 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.<sup>85</sup>

### **Maritime monitoring and surveillance**

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.<sup>86</sup> The Agency's total expenditure is around €156 m per year.<sup>87</sup> Marine Scotland Compliance is responsible for monitoring and enforcement of marine and fishing laws in Scottish waters.

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 m in 2011/12.<sup>88</sup> There may be other programmes of monitoring of the seas but no information was found collating expenditure across these programmes.

Marine planning in the UK is the contribution to the Marine Spatial Planning initiative across the EU. The role of the marine planning authorities (see also Section 5) is to take decisions on proposed developments in the plan area in accordance with the Marine Policy Statement (MPS) marine plans, in a way that integrates and balances all the current marine and future activities into a comprehensive plan.<sup>89</sup> The plans are drawn up on a regional basis. It is intended to increase the efficient use of space and resources amongst the competing interests of the various users of the sea.

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<sup>82</sup> Environment Agency (2013), *2013/14 Flood and Coastal Risk Programmes of Work Approved by Regional Flood & Coastal Committees*, February

<sup>83</sup> Ball T., Werrity A., Duck R.W., Edwards A., Booth L., Black A.R. (2008), *Coastal Flooding in Scotland: A Scoping Study*, SNIFFER, August

<sup>84</sup> SEPA, *Natural Scotland (2012), Flood Risk Management Planning in Scotland: Arrangements for 2012 – 2016*, February

<sup>85</sup> Welsh Government (2011), *National Strategy for Flood and Coastal Erosion Risk Management in Wales*, November

<sup>86</sup> National Audit Office (2009), *The Maritime and Coastguard Agency's response to growth in the UK merchant fleet*

<sup>87</sup> Maritime and Coastguard Agency (not dated), *Business Plan 2013-14*

<sup>88</sup> Centre for Environment, Fisheries and Aquaculture Science (2013), *Annual Report and Accounts*, June

<sup>89</sup> HM Government (2011), *UK Marine Policy Statement*, March.

<sup>90</sup> <http://www.marinemangement.org.uk/marineplanning/>

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

This section allocates the data from Table 2.1 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 2.3 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 <sup>91</sup>	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
		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 2.4 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 2.1. 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.

<sup>91</sup> 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.).

Table 2.4 Overview of employment per maritime economic activity per region in the UK<sup>92,93</sup>

Sea-basin		North Sea	North Sea	North Sea	North Sea	North Sea	Atlantic Arc	Atlantic Arc	North Sea	Atlantic Arc	Atlantic Arc	Atlantic Arc	Other / Unspecified
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
<b>0.</b>	<b>Shipbuilding</b>												
0.a	Shipbuilding and repair	2.7	2.9	3.8	3.7	15.4	18.2	30.8	4.5	12.8	2.6		2.3
0.b	Construction of water projects	12.3	6.6	2.7	5.6	25.2	9.6	7.7	16.2	5.6			7.4
<b>1.</b>	<b>Maritime Transport and shipbuilding</b>												
1.a	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.b	Short-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.c	Passenger ferry services	3.0	11.7	10.7	11.1	16.7	10.8	6.9	8.3		4.4		10.2
1.d	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
<b>2.</b>	<b>Food, nutrition and health</b>												
2.a	Fisheries 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.b	Fisheries for animal consumption	3.5	16.9	0.7	2.9	1.9	5.1	9.7	43.6	12.3	1.1		1.1
2.c	Marine aquaculture								27	63			10
2.d	Blue biotechnology												
2.e	Agriculture on saline soils												
<b>3.</b>	<b>Energy and seabed materials</b>												
3.a	Offshore oil and gas <sup>94</sup>	1.9	1.3	1.3	1.6	7.2	0.7	0.8	77.3	0.0	0.5		0.0
3.b	Offshore wind	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
3.c	Ocean renewable energy							n/a	n/a	n/a		n/a	
3.d	Carbon capture and storage		n/a						n/a	n/a			
3.e	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.f	Marine minerals mining												
3.g	Desalination					100							
<b>4.</b>	<b>Leisure and tourism</b>												
4.a	Coastal tourism (accommodation)	3.3	5.8	5.1	6.0	13.6	12.0	14.0	14.3		5.6		5.3
4.b	Yachting and marinas <sup>95</sup>					50		50					
4.c	Cruise tourism	0.2	2.1	0.2	8.2	37.7	4.0	6.9	20.0		12.6		1.4
<b>5.</b>	<b>Coastal protection</b>												
5.a	Coastal protection				n/a								
<b>6.</b>	<b>Maritime Monitoring and Surveillance</b>												
6.a/6.b	Maritime surveillance												
6.c	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

<sup>92</sup> 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.

<sup>93</sup> Please note: for the regional breakdown, South West England has been assigned entirely to the Atlantic.

<sup>94</sup> We assume that the 77.3 % for Oil & Gas for Scotland (NUTS II), belong 100% to the North Sea

<sup>95</sup> 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

### 3. Ranking the 7 largest, fastest growing and promising 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 editors and the country editor.

#### 3.1. The 7 largest Maritime economic activities

This subchapter identifies the largest maritime economic activities with a ranking order. On the basis of the scores obtained<sup>96</sup> in relation to GVA and persons employed, the 7 largest maritime economic activities have been identified as follows:

**Table 3.1** Listing the 7 largest maritime economic activities in the UK

Rank	Maritime economic activities	GVA (m €)	Employment
1.	Offshore oil and gas	36 364	32 867
2.	Coastal tourism (accommodation) (England only for GVA, GB for employment)	4 087	329 591
3.	Passenger ferry services	976	75 677
4.	Short-sea shipping	3 223	47 732
5.	Shipbuilding and repair	2 537	38 530
6.	Fisheries for human consumption	654	38 826
7.	Deep-sea shipping	1 415	13 048

#### 3.2. The 7 fastest growing 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.

**Table 3.2** Ranking order of the 7 fastest growing maritime economic activities in the UK

Rank	Maritime economic activities	Growth 2008-2010 (CAGR)	Growth 2000-2012 (CAGR)
1.	Fisheries for animal consumption	310.7	n/a
2.	Shipbuilding and repair	12.6	4.3
3.	Cruise tourism	6.8%	11.0%

<sup>96</sup> Please refer to Methodological Annex.

Rank	Maritime economic activities	Growth 2008-2010 (CAGR)	Growth 2000-2012 (CAGR)
4.	Short-sea shipping	-4.7	0.4
5.	Fisheries for human consumption	-4.9	n/a
6.	Deep-sea shipping	-4.9	-0.6
7.	Coastal tourism (accommodation)	-6%	4.5

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.<sup>97</sup> 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.

### 3.3. Identification of promising maritime economic activities

The selection of maritime economic activities which hold a clear promise towards the future, even if they might be small today, is done on a number of criteria. The most important element aspect is the innovation level of the sector. The innovation level of maritime economic activities is analysed on the basis of a number of innovation criteria. The scoring on innovation is complemented with a set of other criteria, which are qualitatively scored, to arrive at a more comprehensive insight of the potential of a maritime economic activity.

#### 3.3.1. Innovation indicators

The innovation indicators are inspired by the recent communication on innovation indicators which aim to capture the innovation level of a country<sup>98</sup>. The following two indicator sets are included<sup>99</sup>:

Indicator	Explanation	Source
<b>Technological innovation</b>		
1. Scientific publications	Number of scientific publications in a MAE in a Member State in relation to the GVA (€ mln) of that maritime economic activity <sup>100</sup> .	Thomson Reuters (2011) <sup>101</sup>
2. Patents	Number of patents in a MAE in a Member State in relation to the GVA (€ mln) of that maritime economic activity.	Thomson Reuters (2011)
<b>R&amp;D expenditure</b>		
3. R&D expenditure/GVA	R&D expenditure as a percentage of value added <sup>102</sup> (2007 and most recent available year).	OECD, ANBERD database
4. RTD expenditure/turnover	R&D expenditure as a percentage of company turnover. Data are available for UK only.	Amadeus company database

<sup>97</sup> These maritime economic activities, however, could not be measured in terms of CAGR.

<sup>98</sup> European Union, 2013: Measuring innovation output in Europe: towards a new indicator. COM(2013)624 final

<sup>99</sup> Dependent on data availability

<sup>100</sup> For small economic activities a default value of € 1 million has been used. The analysis was performed for 10 MEAs.

<sup>101</sup> Analysis carried out in 2011 by Ecorys in the context of the general Blue Growth study. The analysis is based on Thomson Reuters data.

<sup>102</sup> This indicator can be calculated for a few sectors only and are in most cases expressed at a higher sector level (e.g. oil & gas as part of the larger sector mining & quarrying). Only for shipbuilding a relatively straightforward match can be reached.

### 3.3.2. Other indicators

The innovation scores per MAE have been complemented with a number of additional criteria which have been scored in a qualitative manner. These include:

- Potential for competitiveness of EU industry, in comparison to the global industry in the respective segments;
- Future employment creation;
- Relevance for EU-based policy initiatives in that specific economic activity;
- Spill-over effects and synergies with other economic activities;
- Sustainability and environmental aspects.

**Table 3.3 Future potential of economic activities**

Maritime economic activity	Innovation Indicators					Other indicators				
	Publication/GVA	Patents/GVA	R&D/GVA (2007/8)	R&D/turnover	Composite score <sup>d</sup>	Competitiveness	Employment	Policy relevance	Spill-over effects	Sustainability
<b>0. Shipbuilding</b>										
Shipbuilding	n/a	n/a	10.4%	5.3%	●●●●	0	0	0	+	0
Construction of water projects	n/a	n/a	n/a	n/a	●●	0	+	0	+	0
<b>1. Maritime transport</b>										
Deep-sea shipping	n/a	n/a	0.0% <sup>a</sup>	0.7%	●	0	0	0	0	0
Short-sea shipping	n/a	n/a	0.0% <sup>a</sup>	0.7%	●	0	-	0	0	0
Passenger ferry services	n/a	n/a	0.0% <sup>a</sup>	0.7%	●	0	-	0	0	0
Inland waterway transport	n/a	n/a	0.0% <sup>a</sup>	0.7%	●	0	-	0	0	0
<b>2. Food, nutrition and health</b>										
Fisheries for human consumption	n/a	n/a	0.8% <sup>b</sup>	1.2%	●	0	-	+	-	0
Fisheries for animal feeding	n/a	n/a	0.8% <sup>b</sup>	1.2%	●	0	0	0	-	-
Marine aquaculture	2.3	0.8	n/a	n/a	●	+	-	0	-	0
Blue Biotechnology	479	59	n/a	n/a	●●●●	+	+	+	+	+
Agriculture on saline soils	n/a	n/a	n/a	n/a	●	0	0	0	0	0
<b>3. Energy and seabed materials</b>										
Offshore oil and gas	0.0	0.0	0.3% <sup>c</sup>	2.9%	●●●	+	0	0	0	-
Offshore wind	173	66	n/a	n/a	●●●●	+	+	+	+	+
Ocean renewable energy	351	259	n/a	n/a	●●●●	+	0	+	+	+
Carbon capture and storage	n/a	n/a	n/a	n/a	●●	-	0	+	0	+
Aggregates mining (sand, gravel, etc.)	n/a	n/a	n/a	n/a	●	0	0	+	-	0
Marine minerals mining	204	64	n/a	n/a	●●●●	0	0	0	0	-
Desalination	29	85	n/a	n/a	●●●	-	0	0	0	-
<b>4. Leisure and tourism</b>										
Coastal tourism (accommodation)	n/a	n/a	n/a	0.1%	●	0	0	0	0	0
Yachting and marinas	n/a	n/a	n/a	n/a	●●	+	0	0	0	0
Cruise tourism	n/a	n/a	n/a	n/a	●●	+	+	0	+	0
<b>5. Coastal protection</b>										
Coastal protection	43	134	n/a	n/a	●●	+	0	+	+	0
<b>6. Maritime monitoring &amp; surveillance</b>										

Maritime economic activity	Innovation Indicators					Other indicators				
	Publication/GVA	Patents/GVA	R&D/VA (2007/8)	R&D/turnover	Composite score <sup>d</sup>	Competitiveness	Employment	Policy relevance	Spill-over effects	Sustainability
Maritime surveillance	16	51	n/a	n/a	●●	0	0	+	0	0
Environmental monitoring	853	104	n/a	n/a	●●●●	0	0	+	0	+

- a) Transportation & storage
- b) Agriculture/fisheries/forestry
- c) Mining & quarrying
- d) For those maritime economic activities for which no innovation indicators are available this is based on expert judgement

Based on the above indicator score 7 promising activities have been identified. This selection is primarily based on the composite innovation score, followed by the rank on the other indicators.<sup>103</sup>

**Table 3.4** 7 promising maritime economic activities

Rank	Maritime economic activities
1.	Blue biotechnology
2.	Offshore wind
3.	Ocean renewable energy
4.	Environmental monitoring
5.	Shipbuilding
6.	Offshore oil & gas
7.	Cruise tourism

<sup>103</sup> The overall rank for the other indicators has been established by adding the + and deducting the -.



## 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 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)<sup>104</sup>.”

### 4.1. Maritime clusters in the UK

Building on the clusters already identified in the Blue growth study<sup>105</sup> and complemented with cluster identified in the EU Cluster Observatory<sup>106</sup> 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 4.1** Maritime clusters in the UK<sup>107</sup>

Blue Growth study	Longlist of maritime clusters EU Cluster Observatory	Location of the cluster	Maritime economic activities in the cluster
	E Riding and N Lincolnshire	North Sea and English Channel	
Aberdeen	NE Scotland	North Sea and English Channel	Oil and Gas <sup>108</sup>
Scottish West Coast	Highlands and Islands, SW Scotland	Atlantic Arc	Offshore wind, marine aquatic resources, aquaculture, fisheries, ocean renewable energy, blue biotech
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

<sup>104</sup> Prof. Michael E. Porter, 20120213, MOC2012 (HBS course) Session 5 - final

<sup>105</sup> In the previous Blue Growth study, these were: Bretagne, Brest, Marseilles, ES: Galician Coast, Barcelona;

<sup>106</sup> The EU Cluster Observatory denotes maritime clusters and tourism clusters.

<sup>107</sup> 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.

<sup>108</sup> Oil and gas also in Lerwick

Blue Growth study	Longlist of maritime clusters EU Cluster Observatory	Location of the cluster	Maritime economic activities in the cluster
	East Scotland	North Sea and English Channel	

### Shortlist of maritime clusters in the UK for in-depth analysis<sup>109</sup>

The cluster analysis builds on the regional allocation of economic activities as described under section 2.2. 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 Scotland) are analysed according to the following aspects (Table 4.4):

- 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 4.2):

- 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 4.2** Description of maritime clusters

Cluster	Maritime economic activities concerned	Unemployment rate at cluster level <sup>110</sup> (NUTS III or II level)	Ongoing research: main research institutes / companies associated to the clusters
Aberdeen	Oil and gas production	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	Naval shipbuilding, Commercial shipbuilding, Marine aquaculture	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 <sup>111</sup>	Tourism, Fisheries for human	5.1% in Dorset and Somerset (Eurostat, 2012)	Marine Institute at Plymouth University, Centre for Environment,

<sup>109</sup> 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.

<sup>110</sup> 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.

Cluster	Maritime economic consumption	Unemployment rate at	Ongoing research: main
			Fisheries and Aquaculture Science at Brixham

**Table 4.3** Education figures of the maritime clusters

Cluster	Number of students in higher education	Number of students in higher education following courses for employment in blue economy
Aberdeen	n/a	n/a
Scottish West Coast	n/a	n/a
South West England	n/a	n/a

**Table 4.4** List and strengths and weaknesses of clusters

Cluster	Maritime economic activities covered	Strengths	Weaknesses
Aberdeen	Oil and gas production	Offshore engineering and hydrocarbon exploration and production expertise	
Scottish West Coast	Naval shipbuilding, Commercial shipbuilding, Marine aquaculture	Defence ship technology, car ferries, salmon fisheries	
South West England	Tourism, Fisheries for human consumption	Climate, scenery and beaches Inshore fishing fleet	Cost of transport, small scale of fishing activities

<sup>111</sup> 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.



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

The principal policies in the UK concern exploitation of energy resources, both mineral and renewable, the protection of the environment, fisheries management and the coordinated control of marine activities.

Since the 1970s, the UK has had policy on licensing exploration and production of oil and gas from the UK Continental Shelf, coupled with a fiscal policy for taxation. Recent revisions to this policy have seen a rise in investment even as production from old fields has steadily declined. A much more recent innovation is the licensing of offshore wind, and to a much lesser extent, marine renewables. Together with policies on economics support of offshore wind, research and development facilities, and a Green Investment Bank, the UK has stimulated an offshore wind sector which now attracts billions of Euros of investment a year and contributes a large part of the UK's renewable power generation. As a result, the UK has some of the world's largest offshore wind farms.

The UK has strengthened its protection of the marine environment recently by announcing the creation of Marine Conservation Zones, which will reduce the pressure from fishing and other marine activities on areas containing priority natural assets. To facilitate the efficient use of marine space and resources marine planning has been introduced so that the many competing interests in changes in use of the sea can be done most effectively<sup>112</sup>. This has been implemented on a regional basis in the UK<sup>113</sup>. The Marine and Coastal Access Act 2009 divides the UK marine areas into marine planning regions with an associated plan authority who prepares a marine plan for the area. In Scotland, Wales and Northern Ireland, the devolved administrations are the planning authorities whilst in England it is the Marine Management Organisation (MMO).

Onshore, a recasting of land use planning control has led to new ports planning guidance with the intention of enabling the provision of modern, efficient port capacity for the UK.

Fisheries management and science remains an important area of focus, recognising that much of the policy competence is vested in the European Union. The UK is running a pilot of new quota management in line with recent reform of the Common Fisheries Policy, and has an ongoing programme of reform of the management of the inshore fleet, and of greater localisation of management of stocks and fishing effort, and the trial of community quota ownership is noteworthy.

The analysis is comprised of two interlinked analysis:

Table 5.1 provides an overview of maritime policies (national, regional and EU level) and assesses their impact.

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<sup>112</sup> <http://www.marinemanagement.org.uk/marineplanning/>

<sup>113</sup> <http://www.marinemanagement.org.uk/marineplanning/areas/index.htm>

Table 5.1 – 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
National Policy Statement on ports planning <sup>114</sup>	To give guidance on port development	Port infrastructure development	More timely, appropriate and efficient port investment	An improved investment environment which takes account of environmental impacts	The impact on investment is not known	
Electricity market reform and offshore wind energy <sup>115,116</sup>	To stimulate investment in offshore wind and contribute to decarbonisation objectives for power and energy supply	Value for money in financial support for offshore wind	Continuing large-scale investment in offshore wind power	Contributes to decarbonisation of the economy, which is one of the themes of sustainable growth	Intended to give investors confidence to invest in more than a further 10 GW of wind power capacity by 2020	
Licensing of wind and marine energy <sup>117</sup>	To facilitate and coordinate deployment of renewable power plant and protect the environment	Creation of a stable licensing regime and commissioning of environmental monitoring studies	Enables the development of offshore wind and marine renewables	As above	As above	
CCS pilot programme and research and development programme <sup>118</sup>	To deploy one commercial-scale CCS plant and develop the supply chain	Funding of capital and operating costs of plant and testing of commercial and other ancillary arrangements	Potential future use for closed gas or oil fields and aquifers	As above	Funding through a levy on electricity bills and grants from central government	
Oil and gas exploration and production licensing <sup>119</sup>	To maximise economic production from UK Continental Shelf	Efficient exploitation of hydrocarbon reserves and attracting investment	Encourages hydrocarbon exploration and production	Sustains the oil and gas production sector in the UK and contributes tax revenues	Enables large-scale upstream oil and gas investment and downstream investment in oil refining and petrochemicals	
Marine Planning	To coordinate planning control for marine activities	To allocate marine space across activities such as transport, energy and fisheries, and to regulate environmental impacts	More efficient decision-making, allowing investment to proceed more quickly	Supplies some of the institutional arrangements for delivering sustainable growth	Impact on investment is not known. No impact on funding	

<sup>114</sup> Department for Transport (2012), *National Policy Statement for Ports*, January

<sup>115</sup> DECC (2013), *Energy Trends*, September

<sup>116</sup> DECC (2013), *Electricity Market Reform: Consultation on proposals for implementation*, October

<sup>117</sup> The Crown Estate (2013), *The Crown Estate role in offshore renewable energy development: Briefing*

<sup>118</sup> DECC (2012), *CCS Roadmap, Innovation and R&D*, April

<sup>119</sup> House of Commons Energy and Climate Change Committee (2009), *UK offshore oil and gas*, June

Policy	Objectives	Priorities	Consequences for maritime activities	Impacts on sustainable growth	Investment and funding	Other generic policies with high impact on maritime economic activities
Marine Conservation Zones <sup>120</sup>	To protect species-rich marine areas	To protect from damage areas of special character or species richness	Areas set up in which marine activities are newly controlled, reduced or excluded	Improved environmental outcomes and some restrictions on economic activities	Impact on investment is not known	
Community fisheries quota management	To allow more fisher involvement in catch and stock management	Local management and accountability for fisheries	Changes to institutional arrangements with the intention of reducing the incentive to over-exploit fisheries	Increased and more productive fish stocks	Discourages over-investment in vessels and requires little funding	
Fisheries catch quota pilot <sup>121</sup>	To reduce discards from commercial fisheries	Testing reform of quota management to reduce discarding	Might lead to changes in fisheries monitoring methods and quota rules	May reduce fish mortality from harvesting while maintaining landings	Direct government funding of pilot	
Defence procurement	To secure future supply of military vessels	New advanced surface ships and submarines built in the UK	Continued investment and employment in naval ship yards in the UK	Large locally important employers and supply chains are sustained	Large scale investment directly funded by government	

<sup>120</sup> DEFRA (2013), *Marine Conservation Zones: Site designation and summary of site-specific consultation responses*, November

<sup>121</sup> Marine Management Organisation (2013), *Catch Quota Trial 2012: Final Report*, July





## 6. 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 United Kingdom (Table 2.1). 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 2.1). Detailed reference regarding the sources of the data will complement the data.

**Table 6.1 Selection table of the most relevant figures and detailed references**

Maritime economic activity		Source	GVA (€ m)	employment (abs. nrs)	Comments
<b>0. Other sectors</b>					
0.a	Shipbuilding and repair	Eurostat	1 995	33 925	
		National statistics	<b>2 537</b>	<b>38 530</b>	
		Alternative	1 395	35 000	The Crown Estate (2008)
0.b	Construction of water projects	Eurostat	132	1 636	
		National statistics	<b>279</b>	<b>1 656</b>	
		Alternative	267	6 200	The Crown Estate (2008). Figure includes coastal protection and construction of wind farms
<b>1. Maritime transport</b>					
1.a	Deep-sea shipping	Eurostat	<b>1 415</b>	14 370	no employment data for NACE sector 50.20
		National statistics	1 899	<b>13 048</b>	ONS, DfT (2012)
		Alternative	3 977	28 100	The Crown Estate (2008), figure for 2004, includes shortsea shipping
1.b	Short-sea shipping	Eurostat	<b>3 223</b>	32 744	no employment data for NACE sector 50.20
		National statistics	n/a	<b>47 732</b>	
		Alternative	included in above	included in above	The Crown Estate (2008)
1.c	Passenger ferry services	Eurostat	2 590	26 309	no employment data for NACE sector 50.20
		National statistics	<b>976</b>	<b>75 677</b>	
		Alternative	n/a	n/a	
1.d	Inland waterway transport	Eurostat	133	1 707	
		National statistics	<b>28</b>	<b>3 635</b>	
		Alternative	n/a	n/a	
<b>2. Food, nutrition and health</b>					
2.a	Fisheries for human consumption	Eurostat	1 960	43 869	JRC (fishing), Eurostat (fish processing, wholesale & retail), PRODCOM (share of human/animal)
		National statistics	<b>654</b>	12 400	ONS, MMO
		Alternative	945	31 336	The Crown Estate (2008). Including fish farming, sea fisheries and fish processing
2.b	Fisheries for animal consumption	Eurostat	<b>58</b>	1 491	JRC (fishing), PRODCOM (share of human/animal)
		National statistics	n/a	32 867	
		Alternative	included in above	included in above	
2.c	Marine aquaculture	Eurostat	<b>136</b>	<b>1 411</b>	JRC
		National statistics	n/a	10 600	Scottish government
		Alternative	included in above	included in above	
2.d	Blue biotechnology	Eurostat	n/a	n/a	

Maritime economic activity		Source	GVA (€ m)	employment (abs. nrs)	Comments
		National statistics	n/a	n/a	
		Alternative	n/a	n/a	
2.e	Agriculture on saline soils	Eurostat	n/a	n/a	No data on % saline soils per NUTS-2 for the UK in Eurostat
		National statistics	n/a	n/a	
		Alternative	n/a	n/a	
<b>3. Energy and sea bed materials</b>					
3.a	Offshore oil and gas	Eurostat	3 713	37 797	Employment 2009. No GVA data on NACE 06.10 and 06.20
		National statistics	<b>36 364</b>	<b>32 867</b>	ONS, DECC
		Alternative	23 219	290 000	The Crown Estate (2008), data include supply chain
3.b	Offshore wind	Eurostat	n/a	n/a	
		National statistics	n/a	10,600	
		Alternative	<b>n/a</b>	<b>10 600</b>	Renewable UK
3.c	Ocean renewable energy	Eurostat	n/a	n/a	
		National statistics	n/a	n/a	
		Alternative	12	50	The Crown Estate (2008), data for 2005-6; likely higher today.
3.d	Carbon capture and storage	Eurostat	n/a	n/a	
		National statistics	n/a	n/a	
		Alternative	n/a	n/a	
3.e	Aggregates mining	Eurostat	<b>23</b>	414	Offshore share based on UEPG
		National statistics	n/a	<b>1 030</b>	
		Alternative	133	1 670	The Crown Estate (2008)
		Alternative	n/a	1 150	British Geological Survey/BMAPA (2007)
3.f	Marine minerals mining	Eurostat	n/a	n/a	
		National statistics	n/a	n/a	
		Alternative	<b>0</b>	<b>0</b>	
3.g	Desalination	Eurostat	n/a	n/a	
		National statistics	n/a	n/a	
		Alternative	<b>0</b>	<b>0</b>	No sea & brackish water based production present in the UK according to Global Water Insights
<b>4. Leisure and tourism</b>					
4.a	Coastal tourism (accommodation)	Eurostat	7 981	274 668	data for 55.30 and 55.90 missing for 2010
		National statistics		<b>329 591</b>	ONS
		Alternative	2 644	90 000	The Crown Estate (2008)
		Alternative	<b>4 087</b>	210 000	Beatty et al
4.b	Yachting and marinas	Eurostat	n/a	n/a	
		National statistics	n/a	n/a	
		Alternative	220	14 200	The Crown Estate (2008)
		Alternative	<b>28</b>	<b>1 400</b>	British Marine Fededation
4.c	Cruise tourism	Eurostat	<b>395</b>	<b>4,017</b>	no employment data for NACE sector 50.10
		National statistics		4,017	
		Alternative	1,027	10,470	The Crown Estate (2008)
<b>5. Coastal protection</b>					
		Eurostat	n/a	n/a	
		National statistics	n/a	n/a	
		Alternative	115	1,150	Eurostat COFOG; PRC the Economics of Climate change, data for 2008

Maritime economic activity		Source	GVA (€ m)	employment (abs. nrs)	Comments
<b>6. Maritime monitoring and surveillance</b>					
6.a	Maritime surveillance	Eurostat	n/a	n/a	
		National statistics	n/a	n/a	
		Alternative	n/a	n/a	
6.b	Environmental monitoring	Eurostat	n/a	n/a	
		National statistics	n/a	n/a	
		Alternative	564	16,035	The Crown Estate (2008) Figure on employment appears too high



## 7. Annex II – Growth rates of the maritime economic activities

Maritime economic activity	Indicator	Source	Availability	CAGR (2008-2010)	CAGR (2000-2012)	Notes	
<b>0. Other sectors</b>							
0.a	Shipbuilding and repair	Volume index of production, Gross data	Eurostat	2000-2012	12.6%	4.3%	Data for repair only, not newbuilding
0.b	Construction of water projects	GVA	Eurostat	2008-2010	-23.9%	n/a	
<b>1. Maritime transport</b>							
1.a	Deep-sea shipping	Volume of deep sea cargo shipped, 1000 tons	Eurostat	2000-2011	-4.9%	-0.6%	
1.b	Short-sea shipping	Volume of short sea cargo shipped, 1000 tons	Eurostat	2000-2011	-4.7%	0.4%	
1.c	Passenger ferry services	1000PASF - 1000 passengers (excluding cruise passengers)	Eurostat	2004-2011	-1.7%	-2.8%	
1.d	Inland waterway transport	1000 tonnes transported on inland waterways	Eurostat	2007-2012	-3.2%	-0.4%	
<b>2. Food, nutrition and health</b>							
2.a	Fisheries for human consumption	GVA	Eurostat	2008-2010	-4.9%	n/a	
2.b	Fisheries for animal feeding	GVA	Eurostat	2008-2010	310.7%	n/a	
2.c	Marine aquaculture	n/a			n/a	n/a	
2.d	Blue biotechnology	n/a			n/a	n/a	
2.e	Agriculture on saline soils	n/a			n/a	n/a	
<b>3. Energy &amp; sea bed minerals</b>							
3.a	Offshore oil and gas	primary production of oil and gas in TOE	Eurostat	2000-2011	-8.0%	-7.7%	
3.b	Offshore wind	n/a			n/a	n/a	
3.c	Ocean renewable energy	n/a			n/a	n/a	
3.d	Carbon capture and storage	n/a			n/a	n/a	
3.e	Aggregates mining	Marine Aggregates (millions tonnes) - UEPG data	Eurostat	2008-2010	-8.7%	n/a	
3.f	Marine minerals mining	n/a			n/a	n/a	
3.g	Desalination	n/a			n/a	n/a	
<b>4. Leisure &amp; tourism</b>							
4.a	Coastal tourism (accommodation)	Index turnover, Gross data (all accommodation NACE 55)	Eurostat	2000-2012	-6.0%	4.5%	
4.b	Yachting and marinas	n/a			n/a	n/a	

Maritime economic activity	Indicator	Source	Availability	CAGR (2008-2010)	CAGR (2000- 2012)	Notes
4.c	Cruise tourism	1000PASC - 1000 cruise passengers starting and ending a cruise	Eurostat	2004-2011	6.8%	11.0%
<b>5. Coastal protection</b>						
5.a	Coastal protection	n/a			n/a	n/a
<b>6. Maritime monitoring &amp; surveillance</b>						
6.a	Maritime surveillance	n/a			n/a	n/a
6.b	Environmental monitoring	n/a			n/a	n/a