



The economic contribution of the Maritime Sector in Scotland

A Cebr report for Maritime UK

August 2019

Cebr

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Authorship and acknowledgements

This report has been produced by Cebr, an independent economics and business research consultancy established in 1992. The views expressed herein are those of the authors only and are based upon independent research by them.

The industry figures making up the broad Maritime sector are not always additive because some of the reports have been customised to cater for the overlap between certain industries. Simply adding together the industries would therefore produce a degree of double counting. Nonetheless, the broad Maritime report has had this double counting stripped out. Cebr believes fundamentally in the thoroughness and robustness of its approach and, as such, we stand by our own unbiased and fresh examination of the role of the Maritime sector and its constituent industries in the UK.

The report does not necessarily reflect the views of Maritime UK. The report does not necessarily reflect the views of Maritime UK.

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Executive Summary

- The Centre for Economics and Business Research (Cebr) has been commissioned by Maritime UK to quantify the economic contribution of the Maritime Sector in Scotland. This report forms one of ten reports which also assess the contribution of the Maritime Sector, as a whole, at industry-level and in Wales, Liverpool City Region and Solent Local Enterprise Partnership (LEP).
- **In this context, the Maritime Sector has been defined as consisting of the shipping, ports, leisure marine, marine engineering and scientific and Maritime Business Services industries.** Each of these entities comprises a multitude of different activities, data for which has been aligned against the national accounts framework.
- The Maritime Sector in Scotland makes a substantive macroeconomic contribution to the Scottish and UK economies through business turnover, Gross Value Added (GVA), employment and through the compensation of employees. **It is estimated that the Maritime Sector directly supported just under £9.9 billion in turnover, £3.7 billion in GVA and 41,000 jobs in Scotland in 2017.** This respectively equates to approximately 21% of turnover, 27% of GVA and 19% of employment directly supported by the UK-wide Maritime Sector in 2017.
- With a large proportion of employment in the Marine Oil and Gas activities concentrated in Scotland, **the marine engineering and scientific industry is the largest constituent industry within the Scottish Maritime Sector in terms of economic activity, directly contributing £2.5 billion in GVA and directly supporting around 29,000 jobs in 2017.** This compares to £860 million and £240 million in GVA directly contributed by the shipping and ports industries respectively in Scotland.
- **Employees in the Scottish Maritime Sector are found to be highly productive in the eight years considered in this study.** The average job is estimated to have contributed around £90,600 in GVA in 2017; this compares favourably to productivity in the UK Maritime sector of £77,400 and £54,330 across the UK in general. There is thus a large proportion of high value jobs in the Scottish Maritime Sector.
- By extension of its significant direct contributions to GVA and employment, the Maritime Sector in Scotland also helps to raise a significant amount of tax revenue each year for the UK Exchequer. **The Maritime Sector contributed an estimated total of £900 million in tax revenues in 2017, spread across VAT, Corporation Tax, Income Tax, National Insurance Contributions (NICs) and Business Rates.**
- After quantifying the aggregate economic impacts through the industry supply chains and induced effects on expenditures, **it is estimated that the Maritime Sector in Scotland helped to support a total of £7.8 billion of GVA in 2017, an increase from £6.8 billion in 2010.**
- These aggregate economic impacts associated with the Scottish Maritime Sector also extend to business turnover, employment and the compensation of employees. **It is estimated that the Maritime Sector in Scotland helped to support a total of £19.5 billion in turnover (through business turnover), 155,000 jobs and £5.1 billion through the compensation of employees in 2017.**
- Our forecast indicates that Scottish-based Maritime **turnover and GVA are set to grow at a Compounded Annual Growth rate of 2.6% over period 2017 to 2023.** This translates into a cumulative nominal growth of 14% for 2019-2023.

1 Introduction

Cebr is pleased to present this report to Maritime UK and Scottish Enterprise on the economic impact of the Maritime Sector in Scotland. In this context and henceforth, the “Maritime Sector” is defined as comprising the shipping, ports, leisure marine, marine engineering and scientific (MES) and Maritime Business Services (MBS) industries.

This report forms one of ten reports focusing on the economic contribution of the UK Maritime Sector, with the other reports focusing on the economic contribution of each of the five industries at UK level, the economic contribution of the sector in Wales, Liverpool City Region, Solent LEP and the sector at UK-level. It is therefore important to consider this report as part of the wider framework set out in the ten reports, which set out the impact of the Maritime Sector both at a national and regional level. Our examination spans the period from 2010 to 2017 inclusive, with the latter being the latest year for which full data are available, and endeavours to capture the full economic ‘footprint’ of the Maritime Sector in Scotland. As such, our report is not confined to direct ongoing contributions to GDP and employment through operations and activity in Scotland, but also provides assessments of the associated indirect and induced multiplier impacts.

1.1 About Maritime UK

Maritime UK is the promotional body for the UK’s Maritime Sector, representing companies and partner organisations in the shipping, ports, leisure marine, marine engineering and scientific and Maritime Business Services industries. It acts to promote the sector, influence government and drive growth.

1.2 Purpose of this report

This report provides an in-depth assessment of the economic contribution that the Maritime Sector makes to Scotland’s economy. As such, our analysis combines Cebr’s estimates for the economic contribution of the Maritime Sector at UK-level with regional analysis and insights in order to produce estimates for Scotland. Scotland is a leading region for the UK Maritime Sector, hosting a number of both major and minor ports, in addition to substantial marine activity supporting the Oil and Gas industry in the North Sea.

This study seeks to equip Maritime UK and Scottish Enterprise with statistics and figures on the value of the Maritime Sector to the Scottish economy. As such, Cebr has focused on the following key economic indicators: turnover; Gross Value Added (GVA); employment; the compensation of employees and the Exchequer contribution (through tax revenues raised).

1.3 Overview of the study and methodology

Purpose of the study

This report provides a thorough and comprehensive examination of the role of the Maritime Sector in Scotland. It presents a range of analyses demonstrating different aspects of the value contributed by the Maritime Sector, including direct contributions to GDP and employment, indirect and induced multiplier impacts and the Maritime Sector’s contribution to the Exchequer through tax revenues raised.

An important task has been to develop an in-depth understanding of the Maritime Sector both in the UK and in Scotland. To produce a robust study, it is necessary to interrogate the available data to ensure that it captures the full range of activities that should be included in establishing the aggregate economic ‘footprint’ of the Maritime Sector in Scotland. Following the collation of the necessary data capturing these activities, the values of key economic indicators were established to demonstrate the impact of the Maritime Sector in Scotland. The key macroeconomic indicators include:

- The value of the turnover of the Scottish Maritime Sector, and the turnover supported in the UK economy through multiplier impacts.

- GVA¹ contributions to Scottish and UK GDP generated by the Maritime Sector in Scotland, directly and through indirect and induced multiplier impacts.
- Jobs supported by the Scottish Maritime Sector, including direct, indirect and induced jobs through regional multiplier impacts.
- The value of employee compensation² supported by the Scottish Maritime Sector, representing the total remuneration of employees.
- The Exchequer contribution of Scotland's Maritime Sector through tax revenues raised.
- The direct contribution made by the Maritime Sector through Scottish exports of goods and services.

Mapping the UK Maritime Sector in the UK and Scotland

The first stage of the study has involved mapping the activities of the Maritime Sector against the national accounts framework, in order to establish clarity on the precise definition of the Maritime Sector as it maps against the Standard Industrial Classification (SIC) framework.³ For most activities, particularly those of the shipping industry, economic activity can be captured through a particular 3, 4 or 5-digit SIC code.

In essence therefore, this involves taking each of the five Maritime industries and their constituent activities, and mapping these to the most relevant Standard Industrial Classification (SIC) code in order to identify the activity's economic data. For example, "Transport of Passengers and International Sea Faring", identified as an activity of the shipping industry, can be identified through SIC code 50100 within the National Accounts framework. However, some Maritime Sector activities do not map neatly onto the SIC framework; this has required Cebr to draw upon government or industry sources to quantify the contributions made through these activities.

Data Sources

After completing the mapping of Maritime Sector activities, data for the macroeconomic indicators listed above have been obtained and collated by firstly interrogating the indicators gathered at UK level for the Maritime Sector, and disaggregating this at Scottish-level using a combination of publicly-available data sources, industry sources and local estimates.

For those Maritime Sector activities which are in alignment with the SIC framework and are available on a disaggregated basis, the main source of information used in this study is Bureau van Dijk's Financial Accounts Made Easy (FAME) database. FAME provides detailed information on UK and Irish companies as taken from annual reports and other sources up to the latest available year. FAME has been used to establish the aggregated contribution of businesses in the Maritime Sector to the UK economy in terms of turnover, employee numbers and GVA. We also evaluate the breakdown of these business contributions by

¹ GVA, or gross value added, is a measure of the value from production in the national accounts and can be thought of as the value of industrial output less intermediate consumption. That is, the value of what is produced less the value of the intermediate goods and services used as inputs to produce it. GVA is also commonly known as income from production and is distributed in three directions – to employees, to shareholders and to government. GVA is linked as a measurement to GDP – both being a measure of economic output. That relationship is (GVA + Taxes on products - Subsidies on products = GDP). Because taxes and subsidies on individual product categories are only available at the whole economy level (rather than at the sectoral or regional level), GVA tends to be used for measuring things like gross regional domestic product and other measures of economic output of entities that are smaller than the whole economy.

² Compensation of employees is the total remuneration, in cash or in kind, payable by an employer to an employee in return for employers' social contributions, mainly consisting of employers' actual social contributions (excluding apprentices), employers' imputed social contributions (excluding apprentices) and employers' social contributions for apprentices.

³ The United Kingdom Standard Industrial Classification of Economic Activities (SIC) is used to classify business establishments and other standard units by the type of economic activity in which they are engaged.

SIC industrial sector, using the primary and secondary five-digit UK SIC (2007) codes associated with for each company in FAME.

To capture the contribution of those Maritime Sector activities which do not map neatly across the SIC framework, and in order to disaggregate the economic contribution of the sector in Scotland, a variety of other sources have been used. For the former, the study draws upon insight from sector bodies included (but not limited to) British Marine, the Society of Maritime Industries (SMI), BEIS and the UK Chamber of Shipping. A full list of identified Maritime Sector activities and sources is set out in Section 2 of the report.

Quantifying the aggregate economic impacts

After collation and interrogation, the resulting Scottish direct economic impacts have then been embedded within Cebr's regional economic impacts models of the UK economy that we use to assess the kinds of impacts that can be associated with an entity such as the Scottish Maritime Sector.

Cebr's models establish the relationships between industries through supply chain linkages, as well as industries' linkages with government, capital investors and the rest of the world (through trade). The models produce three types of impact for four indicators – turnover, GVA, the compensation of employees, and employment. The three types of impact are:

- **Direct impact:** this is the value and jobs supported directly by the economic activities of the Maritime Sector in Scotland.
- **Indirect impact:** this is the value and jobs supported in industries that supply inputs to Scotland's Maritime Sector.
- **Induced:** this is the value and jobs supported in the wider economy when the direct and indirect employees of the Maritime Sector in Scotland spend their wages and salaries on final goods and services.

These three impacts are then combined to convey the aggregate impact associated with each Maritime industry in terms of business turnover, GVA, employment and the compensation of employees. Cebr has broadly taken a 'top-down' approach to estimate the direct impacts of the four Maritime industries within Scotland. In effect, this involves taking the UK direct impacts of each defined Maritime industry and applying relevant ratios from publicly-available data sources such as the UK Business Register and Employment Survey (BRES) – as well as private data sources such as Bureau Van Dijk's Financial Accounts Made Easy (FAME) database – in order to attribute the contribution from the Maritime Sector in Scotland.

For each of the five Maritime industries, the direct impacts are then combined with the regional economic multipliers provided by Cebr's suite of regional input-output models for Scotland, in order to then generate indirect, induced and subsequently aggregate impacts.

1.4 Structure of the report

The remainder of the report is structured as follows:

- Section 2 sets out how the Maritime Sector has been defined and identified within Scotland for the purposes of this study.
- Section 3 outlines the direct economic impacts of the Maritime Sector within Scotland. We consider the direct impacts through turnover, GVA, employment, the compensation of employees, and contribution to the UK Exchequer through tax revenues contributed by the sector.
- Section 4 considers the multiplier impacts of the Maritime Sector in Scotland through the activities it stimulates in the local supply chain and in the wider economy when employees directly and indirectly employed by the Scottish Maritime Sector spend their wages and salaries in the local and wider economy.

- Section 5 provides a case study on the relevance and importance of the Scottish Maritime cluster as well as looking into the importance of the company Anglo Eastern.
- Section 6 provides a forward look at the Maritime Sector in Scotland to 2023.

2 The Maritime Sector in Scotland

Here we set out how the Maritime Sector has been defined for the purposes of the study. On a holistic level, the Maritime Sector can be disaggregated into the shipping, ports, leisure marine, marine engineering and scientific and Maritime Business Services industries, which in themselves are formed of numerous individual and distinct activities.

2.1 The definition of the Maritime Sector and its constituent industries

Maritime UK have provided a list of activities which fall under the auspices of the Maritime Sector; Cebr has subsequently undertaken a mapping exercise using this list to identify how each of these five industries aligns with the national accounts. For most Maritime Sector activities, a corresponding Standard Industrial Classification (SIC) code exists which enables the identification and quantification of the direct economic impacts using publicly-available data sources. A minority of activities do not map neatly against the SIC framework, necessitating the use of industry or local-level data for quantification purposes.

The Maritime Sector in Scotland has therefore be identified as consisting of the following activities. Each of the sub-sectors have been mapped to their sector by Cebr, in order to attribute Standard Industrial Classification (SIC) codes to the activity to allow their direct impacts to be measured.

- **Shipping industry**
 - International transport of passengers;
 - Transport of passengers on inland waterways;
 - International transport of freight;
 - Transport of freight on inland waterways.
- **Ports industry**
 - Warehousing and storage;
 - Port activities and management;
 - Stevedores, cargo and passenger handling;
 - Border agency, HMRC and public sector employees operating in ports.
- **Leisure Marine:**
 - Boatbuilding (marine leisure vessels);
 - Recreational marine activities, marine finance and legal activities and general marine services;
- **Marine Engineering and Scientific industry:**
 - Shipbuilding;
 - Marine renewable energy;
 - Marine support activities for offshore oil and gas, engineering and mining;
 - Marine science and academic activities, including government vessels and technical consulting;
- **Maritime Business Services industry**
 - Shipbroking services;
 - Maritime Insurance services;
 - Maritime Financial services
 - Maritime Legal services
 - Ship surveying and classification activities;
 - Maritime Education (including Maritime university courses and cadetships);
 - Maritime Consultancy; and

- Maritime Accountancy.

There are some well-known examples for each industry. Shipping includes Calmac Ferries Limited and Caledonian Maritime Assets Limited, both on the West coast of Scotland. Ports includes Aberdeen Harbour, the Port of Dundee and the Port of Leith. Next, companies such as BAE Systems and DOF Group (UK) would fall under Marine. Finally, The Clyde Group would be an example of Maritime Business Services.

2.2 Mapping the Maritime Sector against the National Accounts framework

Here we set out how the direct economic contribution of the industries and activities listed in the previous subsection have been mapped against the national accounts framework. For activities which do not map neatly against this framework – i.e. when SIC codes cannot be used to accurately reflect or capture a particular Maritime Sector-related activity – we outline the industry-level sources to separately quantify the economic contribution. It should be stressed that the Maritime industries as defined here are unlikely to be exhaustive, and that further work may be necessary to fully capture the fullest extent of activities taking place in the Maritime Sector, several of which are often difficult to define within the existing National Accounts framework. There may therefore be a greater role for the UK Government to expand the existing definition of the Maritime Sector, such that the true value of economic activity supported is then measured.

The shipping and ports industries

Table 1 and Table 2 below shows how activities for the shipping and ports industries have been identified, and the data sources used to capture and quantify the associated economic activity.

Table 1: Mapping of Maritime Sector activities: ports activities

GROUPING	ACTIVITY	MAPPING	SOURCE(S) USED
PORTS	Warehousing and Storage	Identified through SIC code 52101, "Operation of Warehousing and Storage Facilities for Water Transport activities". Activities are then mapped to council wards containing major and minor UK ports.	FAME, BRES
	Port Authority Management, Port Security and Marshals, Port Marine and Vessel Management Services, Marine Pilots, Port Harbour Support Vessels, and Engineering and Maintenance	Identified through SIC code 52220, "Service activities incidental to water transportation". Activities are then mapped to council wards containing major and minor UK ports.	FAME, BRES
	Stevedores, cargo and passenger handling including crane/vehicle/plant drivers/operators	Identified through SIC code 52241, "Cargo Handling for Water Transport Activities". Activities are then mapped to council wards containing major and minor UK ports.	FAME, BRES
	Border Agency, Home Office and HMRC staff operating in Ports	Identified as public sector employees operating in UK ports.	Institute for Government, Port Freight Statistics, Cebr analysis

Source: Maritime UK, Cebr analysis

Table 2: Mapping of Maritime Sector activities: shipping activities

INDUSTRY	ACTIVITY	MAPPING	SOURCE(S) USED
SHIPPING	Transport of Passengers International / Sea Faring	Identified through SIC code 50100, "Sea and Coastal Passenger Water Transport".	FAME, BRES
	Transport of Passengers on Inland Waterways	Identified through SIC code 50300, "Inland Passenger Water Transport".	FAME, BRES
	Transport of Freight International/ Sea Faring	Identified through SIC codes 50200 and 77342, "Sea and coastal freight water transport", and "Renting and Leasing of Freight Water Transport Equipment".	FAME, BRES
	Transport of Freight on Inland Waterways	Identified through SIC code 50400, "Inland Freight Water Transport".	FAME, BRES
	Other shipping activity not captured through SIC codes 50100 – 50400 in the FAME database	Identified and quantified through UKCoS statistics for shipping-related employment	UKCoS Manpower Survey, FAME

Source: Maritime UK, Cebr analysis

For the majority of shipping and ports industry activities, business demography data taken from the FAME database has been used to generate UK-level estimates for the direct economic impacts of each activity. Data taken from the ONS Business Register of Employment Survey (BRES) has then been used to disaggregate national level data at Scotland-level. In the case of activities for the ports industry, only activity taking place in council wards in Scotland which contain a major or minor UK port has been captured, on the assumption that warehousing and storage and other activities taking place in these locations relate to the associated port.

The leisure marine and marine engineering and scientific industries

Table 3 and Table 4 below shows how activities for the leisure marine and marine engineering and scientific industries have been identified, and the data sources used to capture and quantify the associated economic activity.

Table 3: Mapping of Maritime Sector activities: marine engineering and scientific industries

INDUSTRY	ACTIVITY	MAPPING	SOURCE(S)
Marine Engineering & Scientific Industry	Shipbuilding and Marine Engineering	Identified in the National Accounts framework through SIC code 3011 ("Building of ships and floating structures") and 3315 ("Repair and maintenance of ships and boats")	ABS, BRES, FAME, Cebr Analysis
	Marine Renewable Energy	Marine renewable energy activities do not map neatly across the SIC framework. Cebr have therefore drawn upon the BIS report, "The size and performance of the UK-low carbon economy" BIS report (2013) to derive employment, turnover and GVA estimates.	BIS, Cebr Analysis
	Marine Support activities for Offshore Oil and Gas, Engineering and Mining	Identified in the National Accounts framework through SIC code 91, "Support activities for petroleum and natural gas extraction".	FAME, Cebr Analysis
	Marine Scientific and Technical	Marine Scientific and Technical activities do not map neatly across the SIC framework, as they are typically bundled together with other activities within the Manufacturing and "Other Scientific and Professional" sectors. Cebr have therefore drawn upon the Society of Maritime Industries (SMI) "Annual Review of UK Marine Scientific Industries" reports to gather data.	SMI, Cebr Analysis

Source: Maritime UK, Cebr analysis

Table 4: Mapping of Maritime Sector activities: leisure marine industry

INDUSTRY	ACTIVITY	MAPPING	SOURCE(S)
Leisure Marine	Boatbuilding (marine leisure vessels)	Leisure boatbuilding has been identified through SIC code 3012 ("Building of pleasure and sporting boats") as well as through the British Marine "Key Performance Indicators for the Leisure, Superyacht and Small Commercial Marine Industry".	ABS, BRES, British Marine, Cebr Analysis
	Other leisure marine activities	Other Leisure Marine activities do not map neatly across the SIC framework, as they are typically bundled together with others within the leisure industries; this precludes the effective use of FAME to gather economic impact data. Cebr have therefore drawn upon the British Marine "Key Performance Indicators for the Leisure, Superyacht and Small Commercial Marine Industry" to derive employment, turnover and GVA estimates, stripping out firms involved in non-leisure marine activities.	British Marine, Cebr Analysis

Source: Maritime UK, Cebr analysis

The marine engineering and scientific industry encompasses activities, such as renewable energy generation and marine scientific activities. The leisure marine industry is defined narrowly as encompassing activities ranging from leisure boat manufacturing to leisure marine services.⁴

⁴ The industry figures making up the broad Maritime Sector are not always additive because the reports have been customised to cater for overlap between certain industries, i.e. leisure marine and Maritime Business Services. Simply adding together the industries would therefore produce a degree of double counting. Nonetheless, the broad Maritime report has had this double counting stripped out.

A key source of information used by Cebr to capture leisure marine activities is the Key Performance Indicators (KPI) analysis produced by British Marine. The KPI analysis is produced each year, drawing upon information supplied to British Marine by its membership, such as company turnover and statistics declarations.

KPI analysis covering the years 2010 to 2017 (inclusive) has therefore been used as a major source of information for capturing and quantifying leisure boatbuilding as well as business and customer marine activities.

The Maritime Business Services industry

The methodology of the Maritime Business Services industry is unique compared to the other reports of this study into the Maritime Sector. The MBS industry is a fairly abstract concept comprising of, for the purpose of this study, eight sub-industries which are not exclusively maritime related and hence do not map neatly onto SIC codes.

For this analysis Cebr has drawn on a variety of data sources to produce a bottom-up analysis for each of the sub-industries. Data is limited for Maritime Financial services and Maritime Accountancy and as such for these sub-industries, we rely on PwC's 2016 study 'The UK's Global Maritime Professional Services: Contribution and Trends', augmenting it with trends in the broader industry to generate estimates for the entire period, 2010 to 2017. The other sub-industries have been computed through a combination of bottom-up analysis using company and financial accounts, FAME, ONS and insights from representatives of the industry.

For a more detailed description of the individual methodologies, please see 'The economic contribution of the UK Maritime Business Services industry' report.

2.3 Quantifying the direct economic impacts of the industry in Scotland

In this final subsection we set out the approach taken to disaggregate the direct economic impacts at regional level for each Maritime industry. For the majority of Maritime Sector activities, the approach taken to disaggregate the direct economic impacts of sector has involved combining the direct economic impacts at UK-level with publicly-available statistics which can be disaggregated at regional level. However, this approach is not always possible, as a result of the difficulties in mapping some activities against the national accounts framework. In these instances, industry-level information has been used to estimate the Scottish proportion of economic activity.

Shipping

In order to disaggregate the economic activity of the shipping industry, it is firstly necessary to identify the proportion of employment in the shipping industry across each UK region.

The major source of employment was the Business Register and Employment Survey (BRES)⁵, as accessed through NOMIS. Employment data associated with each Standard Industrial Classification code for the shipping industry were gathered and an implied regional breakdown estimated after interpolating for some missing information. Shipping employment in Northern Ireland has been estimated using a combination of BRES and the Annual Business Survey, the latter providing the proportion of employment in Northern Ireland across the broader industrial sector categories.

⁵ The Business Register and Employment Survey (BRES), produced by the ONS on an annual basis, is the official source of employee and employment estimates by detailed geography and industry within Great Britain.

Table 5: The breakdown of UK employment in shipping as implied by BRES and ABS, 2010 to 2017

Shipping Employment	2010	2011	2012	2013	2014	2015	2016	2017
England	79.8%	76.4%	77.7%	78.2%	78.9%	80.3%	78.3%	81.5%
Scotland	11.6%	13.1%	13.9%	13.0%	14.8%	12.4%	13.9%	13.9%
Wales	6.0%	7.0%	5.2%	6.0%	4.0%	5.1%	5.5%	2.3%
Northern Ireland	2.6%	3.6%	3.3%	2.8%	2.3%	2.2%	2.3%	2.3%
East of England	7.1%	8.1%	5.4%	6.7%	7.2%	4.8%	9.4%	6.1%
East Midlands	1.7%	0.4%	0.3%	1.2%	5.6%	0.5%	0.0%	0.1%
London	24.0%	26.7%	23.1%	21.5%	25.6%	35.2%	21.8%	22.4%
North East	1.0%	1.1%	0.8%	0.7%	1.2%	1.7%	0.4%	0.2%
North West	7.8%	8.2%	6.6%	8.1%	8.3%	7.7%	9.3%	9.0%
South East	25.1%	23.7%	26.2%	28.6%	24.4%	20.4%	28.4%	33.1%
South West	5.8%	4.2%	9.1%	7.2%	3.6%	6.0%	5.5%	8.3%
West Midlands	3.3%	0.8%	0.4%	0.9%	2.2%	0.8%	1.5%	0.9%
Yorkshire and the Humber	4.2%	3.2%	5.8%	3.2%	0.7%	3.3%	2.0%	1.3%

Source: ONS, Cebr analysis

Ports

The first step in disaggregating the economic activity of the ports industry has been to identify the proportion of employment within council wards which contain a major or minor UK port. It is assumed that employment in ports-related activities (as set out in Table 6 below) within a council ward containing a UK port directly relates to the port. The major source of employment in council wards used was BRES.

A full list of Scottish ports considered as part of this report is provided in the Annex. As with shipping employment, ports employment in Northern Ireland has been estimated using a combination of BRES and the Annual Business Survey, the latter providing the proportion of employment in Northern Ireland across the broader industrial sector categories. Table 6 below shows the proportion of employment in the UK ports industry which applies to Scotland, as estimated using the approach described above.

Table 6: The breakdown of UK employment in ports as implied by BRES and ABS, 2010 to 2017

Ports Employment	2010	2011	2012	2013	2014	2015	2016	2017
England	83.8%	82.2%	84.6%	83.1%	83.9%	85.8%	85.6%	85.4%
Scotland	9.1%	9.6%	9.2%	10.9%	8.9%	8.4%	9.6%	10.1%
Wales	5.5%	6.5%	4.7%	4.5%	5.7%	4.5%	3.2%	3.0%
Northern Ireland	1.6%	1.6%	1.5%	1.5%	1.5%	1.4%	1.7%	1.4%
East of England	16.6%	15.2%	16.7%	14.7%	15.0%	13.5%	14.9%	16.0%
East Midlands	0.5%	1.2%	1.1%	1.3%	0.5%	1.1%	1.0%	1.4%
London	5.2%	6.7%	9.4%	5.8%	7.3%	6.6%	5.8%	4.7%
North East	10.8%	10.2%	11.9%	17.0%	17.4%	12.5%	10.7%	7.1%
North West	5.2%	5.5%	6.9%	8.4%	6.7%	7.4%	9.0%	5.2%
South East	15.0%	14.4%	15.6%	12.7%	17.4%	20.8%	20.5%	25.7%
South West	4.9%	4.2%	6.3%	7.4%	6.0%	6.6%	4.8%	4.2%
West Midlands	0.9%	0.5%	1.1%	1.2%	1.6%	2.0%	2.2%	1.0%
Yorkshire and the Humber	24.7%	24.3%	15.7%	14.6%	12.2%	15.2%	16.5%	20.1%

Source: ONS, Cebr analysis

The Scottish proportion has then been applied to the UK-level estimates for ports employment, with the other key macroeconomic indicators (GVA, Business Turnover and Compensation of Employees) estimated using the implied ratios to employment at UK-level.

Leisure marine and marine engineering and scientific industries

A key source informing the regional disaggregation of the economic activity of the leisure marine and marine engineering and scientific industries is the British Marine Key Performance Indicators, providing the share of leisure marine industry revenue, employment, exports and business numbers across each UK region between 2010 and 2017. GVA for the leisure marine industry in each region has then been estimated using GVA-to-employment ratios.

Following the approach taken for the shipping and ports industries (see above), a combination of data sourced from BRES and the Annual Business Survey have been used to estimate the proportion of employment in Shipbuilding and Marine Offshore Oil and Gas support activities across each UK region. These are set out in Table 7 and Table 8 respectively below.

Table 7: The breakdown of UK employment in Shipbuilding activities as implied by BRES and ABS, 2010 to 2017

Shipbuilding Employment	2010	2011	2012	2013	2014	2015	2016	2017
England	68.9%	68.8%	67.6%	67.5%	65.1%	69.9%	68.0%	68.1%
Scotland	26.5%	26.0%	28.0%	27.5%	30.6%	25.3%	26.5%	27.3%
Wales	1.5%	1.7%	1.2%	1.4%	0.7%	1.3%	1.8%	1.0%
Northern Ireland	3.1%	3.5%	3.3%	3.6%	3.7%	3.5%	3.7%	3.6%
East of England	3.1%	1.3%	1.0%	2.1%	1.3%	1.9%	2.2%	1.6%
East Midlands	0.4%	0.7%	0.9%	0.7%	0.9%	0.2%	0.3%	0.6%
London	0.1%	0.1%	0.8%	0.0%	0.3%	0.2%	0.4%	0.0%
North East	4.4%	3.0%	2.3%	1.4%	1.0%	0.8%	0.8%	0.6%
North West	26.5%	26.0%	28.0%	27.5%	30.6%	37.9%	35.3%	36.4%
South East	11.0%	8.7%	10.5%	8.0%	3.9%	2.9%	2.0%	1.1%
South West	22.0%	26.0%	23.3%	27.5%	26.2%	25.3%	26.5%	27.3%
West Midlands	0.7%	0.4%	0.5%	0.2%	0.2%	0.2%	0.2%	0.1%
Yorkshire and the Humber	0.7%	2.6%	0.2%	0.2%	0.7%	0.4%	0.2%	0.5%

Source: ONS, Cebr analysis

Table 8: The breakdown of UK employment in Marine Offshore Oil and Gas activities as implied by BRES and ABS, 2010 to 2017

Oil & Gas Employment	2010	2011	2012	2013	2014	2015	2016	2017
England	8.1%	12.0%	16.2%	13.7%	11.1%	7.4%	10.0%	5.4%
Scotland	91.4%	87.5%	83.4%	85.8%	88.5%	91.9%	89.2%	94.3%
Wales	0.5%	0.5%	0.4%	0.5%	0.4%	0.7%	0.8%	0.3%
Northern Ireland	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
East of England	1.9%	2.2%	2.6%	2.1%	1.6%	2.0%	1.8%	1.2%
East Midlands	1.4%	1.5%	1.8%	1.2%	1.0%	1.5%	0.8%	0.8%
London	1.0%	1.5%	2.6%	1.4%	0.7%	1.0%	1.8%	1.6%
North East	1.4%	1.7%	0.7%	0.2%	0.2%	0.1%	0.1%	0.1%
North West	0.5%	0.2%	0.1%	0.0%	0.3%	0.2%	0.2%	0.3%
South East	0.4%	2.4%	5.5%	6.0%	3.6%	0.5%	0.5%	0.7%
South West	0.5%	1.0%	1.8%	0.8%	0.8%	0.7%	0.5%	0.0%
West Midlands	0.1%	0.1%	0.1%	0.0%	0.1%	0.1%	0.0%	0.1%
Yorkshire and the Humber	1.0%	1.5%	1.1%	1.9%	2.8%	1.3%	4.2%	0.8%

Source: ONS, Cebr analysis

For the Marine renewable energy activities, the proportion of employment in Scotland has been sourced from the BIS report released in 2015, “The Size and Performance of the UK Low Carbon Economy”.⁶ Previous analysis by BIS suggested that approximately 18% of employment in the Offshore Wind and Marine renewable energy activities in the UK can be found in Scotland. The reader should note that while the case study has not been updated since 2013, the results are still relevant for the updated report. However, the reader should take into consideration that the regional figures will be slightly different for 2017 as to when the study was conducted.

⁶ BIS, 2015. “The size and performance of the UK Carbon Economy, Report for 2010 to 2013.”

Maritime Business Services

When conducting our bottom-up analysis of the MBS Sector, we found that between 75% and 85% of MBS activities were located in the London region. Therefore, we have distributed regional activity for each indicator based on these findings, for example, London was found to account for 84% of MBS GVA and thus the remaining 26% was allocated based on the economic activity of the ports industry in each region.⁷ For further information on the regional disaggregation of Ports industry activities, please refer to Cebr's separate report on the economic activity of the UK ports industry.

Other adjustments for regional economic activity

Other adjustments have been made to the regional disaggregation of the key macroeconomic indicators which represent the direct economic impacts of the Maritime Sector in Scotland, in order to reflect differences in aggregate economic performance between Scotland and the other UK regions. These are as follows:

- To account for regional differences in productivity (GVA per employee), GVA in Scotland has been adjusted using the ONS GVA per employee by region statistics.⁸
- To account for regional differences in wages and salaries, estimated wages and salaries paid to employees in the Maritime Business Services industry have been adjusted using differentials taken from ASHE.⁹
- To account for regional variation in the ratio of compensation of employees to GVA in different sectors, the compensation of employees for the industry have been adjusted using regional differentials implied by the closest industry, as sourced from the Annual Business Survey.

The next sections in this report set out the direct and aggregate economic impacts of the Maritime Sector in Scotland, broken down by Maritime industry.

⁷ The allocation of MBS activity based on port activity comes from the assumption that maritime related services primarily operate within or close to ports. Data on this type of activity is not generally available to produce a rigorous disaggregation and thus we rely on this assumption which may over and understate certain regions, but should reflect major maritime hubs.

⁸ ONS, 2017. Subregional Productivity: Labour Productivity (GVA per hour worked and GVA per filled job) indices by UK NUTS2, NUTS3 subregions and City regions.

⁹ Ibid.

3 The direct economic impact of the Maritime Sector in Scotland

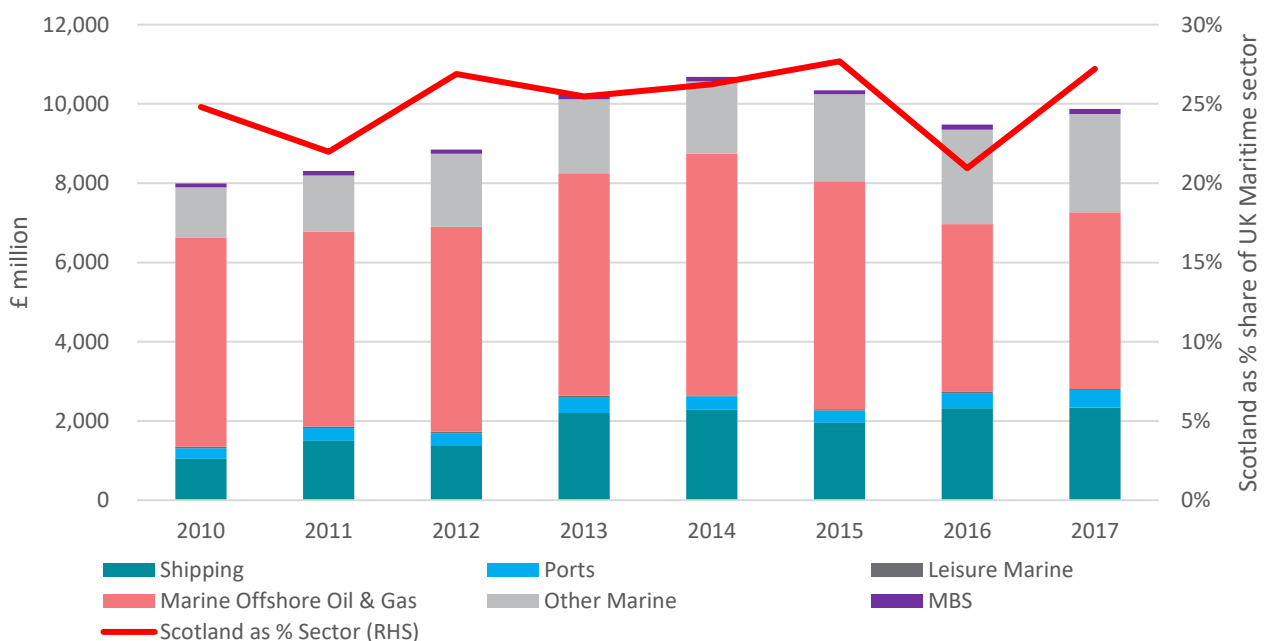
In this section we set out estimates for the direct contribution of the Maritime Sector in Scotland across the following key macroeconomic indicators: Business Turnover (turnover), GVA, employment, the compensation of employees, the Exchequer contribution through tax revenues raised, and exports of goods and services. After quantifying the direct contributions made through the first four of these activities, the aggregate contribution that the Scottish-based Maritime Sector makes to the Scottish and UK economies is then examined in the following section of this report.

The direct economic impacts of the Maritime Sector in Scotland are separated by those contributed by each Maritime industry (shipping, ports, leisure marine, marine engineering and scientific industry, and Maritime Business Services). Due to the disproportionately large contribution from marine offshore support activities for Oil and Gas extraction in Scotland, this activity is separated from the other activities of the marine engineering and scientific industry (shipbuilding, marine renewable energy and marine scientific activities).

3.1 The direct impact through turnover

We firstly consider the total amount of turnover directly supported by the Maritime Sector in Scotland through turnover generated by businesses. Figure 1 below shows the breakdown of business turnover generated by the Maritime Sector and its constituent industries in Scotland between 2010 and 2017. Overall, the sector in Scotland generated an estimated £9.9 billion in business turnover in 2017, an increase of 4.2% from 2016 and 23% higher than the 2010 level.

Figure 1: The estimated turnover of the Maritime Sector in Scotland, and the share of the Maritime sector's aggregate turnover, 2010 to 2017, £ million



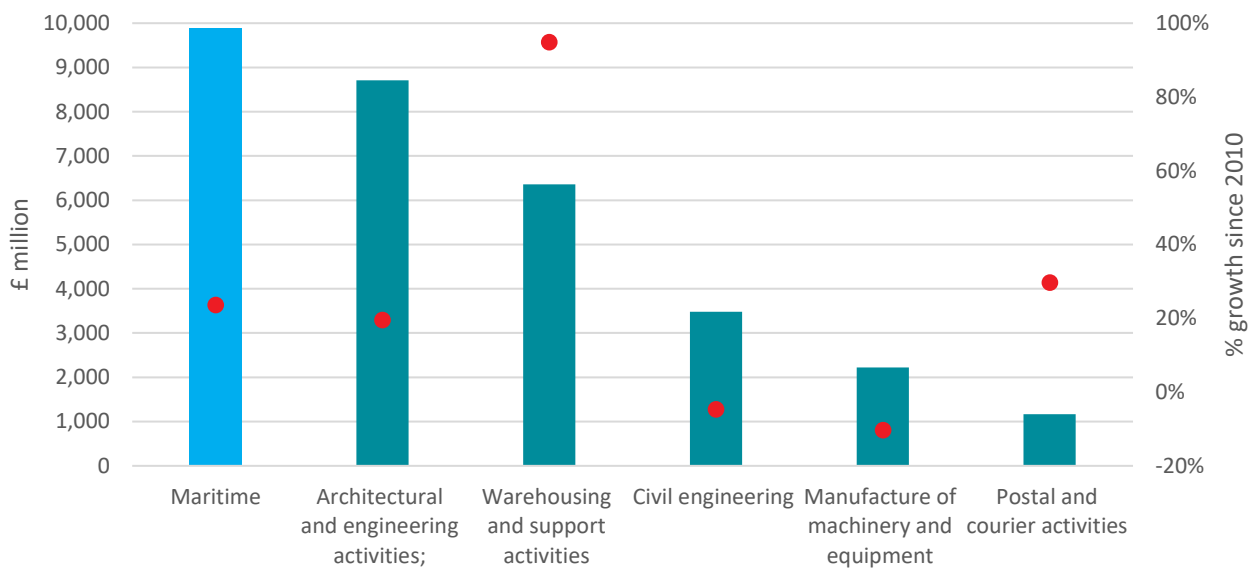
Source: FAME, ONS, Cebr analysis

The marine engineering and scientific industry is the dominant industry contributing 70% of the total turnover in 2017 equivalent to £6.9 billion. Within this industry, Marine Offshore Oil and Gas activities directly contributed £4.4 billion to turnover in 2017; this is unsurprising when the high concentration of this activity's employment is concentrated in Scotland. After the marine engineering and scientific industry, shipping makes the second largest contribution to turnover, with £2.3 billion generated in 2017. Turnover for the shipping industry has increased by 124% since 2010. Adding on to this, there is potential for the

shipping industry to increase turnover further in the next coming years as investments have been made by both the Scottish government and private capital firms to shipbuilding in the Clyde Region. Additionally, a new marine technology manufacturing site situated by the river Clyde has been acquired by Malin Group, a member of the Scottish Maritime cluster.¹⁰ The goal of this new marine manufacturing site is to encourage more high value marine designs and building projects within the region. This new site has the potential to generate additional turnover and GVA for the Scottish Maritime Sector once construction is complete.

To place the direct turnover contribution from the Scottish Maritime Sector in context, Figure 2 below compares the direct turnover of the Scottish Maritime Sector in 2017 with other comparable industries. In 2017, turnover from the Scottish Maritime Sector exceeded that of Architectural and engineering activities, Warehousing and support activities, Civil engineering, Manufacture of machinery and equipment and Postal and courier activities. However, warehousing and support activities experienced the highest growth between 2010 and 2017 at 95%. This is followed by Postal and courier activities at 30% compared to the Maritime Sector at 24%.

Figure 2: The direct contribution through turnover of the Scottish Maritime Sector against comparable Scottish industries in 2017



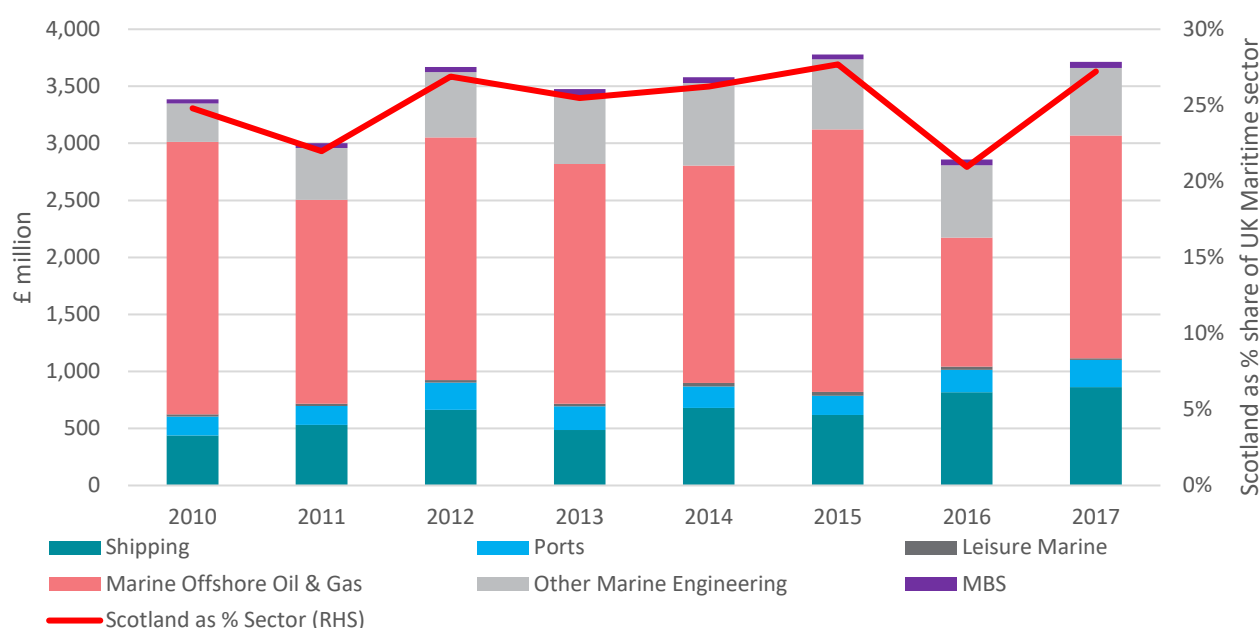
Source: FAME, ONS, Cebr analysis

10 Scottish Maritime Cluster (2019). [‘New Clyde Marine Manufacturing Site.’](#)

3.2 The direct impact through GVA

Following turnover, this subsection illustrates the contributions in terms of the GVA from the Maritime Sector in Scotland to Scottish and UK GDP. Figure 3 below shows this direct impact, disaggregated by industry in the years 2010 to 2017 inclusive.

Figure 3: The direct contribution of the Maritime sector in Scotland through GVA, and the Scotland's share of the Maritime sector's total direct contribution through GVA, 2010 to 2017, £ million



Source: ONS, FAME, Cebr analysis

It is estimated that the Maritime Sector in Scotland directly contributed just over £3.7 billion of GVA in 2017. GVA has remained relatively stable, and on average the Scottish sector has contributed around £3.5 billion to GVA each year with the exception of 2011 and 2016. The most dramatic decrease in GVA can be noted in 2016, where GVA decreased by 24% from the previous year. This is mostly driven by a significant decrease in GVA from the Marine Offshore Oil & Gas industry which halved in value from 2015 to 2016, most likely explained by the fall in the world price of crude oil. However, since 2016, the marine oil and gas industry has regained momentum increasing by 73% from 2016 to 2017.

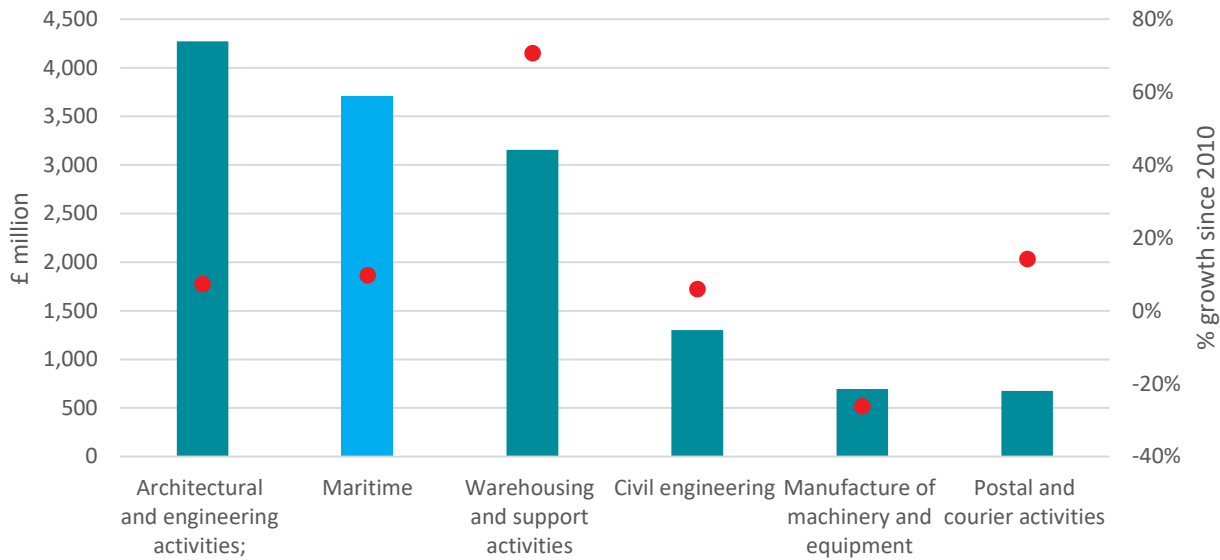
It is estimated that the Maritime Sector in Scotland represented 27.2% of the direct GVA impact of the entire UK sector in 2017. This share of the direct GVA contribution has remained broadly consistent across the eight years considered with the exception of 2016 where the share dropped to 20%. However, as Scotland boasts the majority of economic activity associated with Marine Offshore Oil and Gas – a highly productive sector in terms of GVA generated per job (see further below) – it holds a disproportionately higher share of Maritime Sector GVA when compared to the rest of the UK.

As with business turnover, the marine engineering and scientific industry contributed the largest share of GVA in all of the years considered, on average at 73% across the years considered – around £2.5 billion of GVA was directly contributed by the marine engineering and scientific industry in Scotland in 2017. In contrast, maritime business services make a minor contribution to GVA in Scotland, with approximately £54 million in GVA (1.5%).

To place these results into context, Figure 4 below compares GVA from the Scottish Maritime Sector with other comparable industries in Scotland in 2017. In 2017, the direct contribution of GVA from the Scottish Maritime Sector exceeded that of all comparable industries except for Architectural and engineering activities. In terms of growth, the Scottish Maritime Sector grew by 9.7% from 2010 to 2017, exceeding the

growth of Architectural and engineering activities and civil engineering and manufacture of machinery and equipment.

Figure 4: The direct contribution through GVA of the Scottish Maritime Sector against comparable Scottish industries in 2017

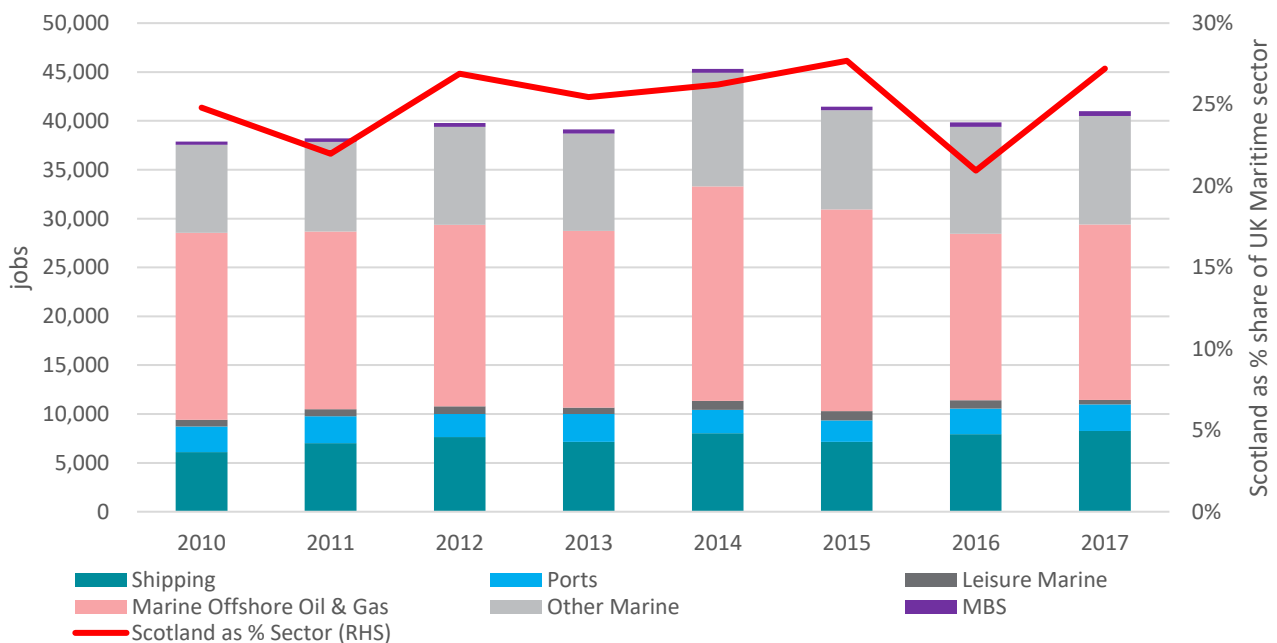


Source: FAME, ONS, Cebr analysis

3.3 The direct impact through employment

This subsection outlines the direct employment impact from the Maritime Sector in Scotland. Figure 5 below shows the estimated direct employment impact from the shipping, ports, leisure marine, MES, and MBS industries in Scotland, in the years 2010 to 2017.

Figure 5: The direct contribution of the Maritime Sector in Scotland through employment, and the Scotland's share of the Maritime Sector's total direct contribution through employment, 2010 to 2017, thousands of jobs



Source: ONS, FAME, Cebr analysis

It is estimated that the Maritime Sector in Scotland directly contributed 41,000 jobs in 2017, with the total level of employment remaining relatively stable since 2010. Across all industries, the share of UK Maritime

Sector employment directly contributed in Scotland is estimated to be 18.6% in 2017. Once again, the largest contributions came from Marine Offshore and Gas activities (18,000 jobs in 2017) and other marine activities of the MES industry (11,100 jobs in 2017). Following this trend, we expect to see a continued rise in employment among other marine activities (specifically marine renewable energy) as further investment have been made into the marine renewable energy sector over the past few years. A recent example of this is the development and construction of marine tidal turbines. Currently, the world's largest most powerful tidal turbine is constructed in Dundee which will not only boost employment within the industry but also turnover and GVA.¹¹

After combining the direct economic impacts of the Scottish Maritime sector through GVA and employment, it is observed that jobs across the sector and each industry are highly productive. Table 9 below shows the levels of productivity across each industry within the Scottish Maritime Sector across the years 2010 to 2017. High productivity levels concentrated in Marine Offshore Oil and Gas activities helps boost the overall productivity of the Scottish Maritime sector in excess of the UK level.

Table 9: Productivity (GVA per employee) in the Scottish Maritime sector and constituent industries, 2010 to 2017

GVA per employee	2010	2011	2012	2013	2014	2015	2016	2017
UK economy	£46,215	£47,176	£48,355	£49,691	£50,877	£51,619	£53,013	£54,330
UK Maritime sector	£69,760	£68,554	£78,170	£74,721	£75,599	£75,209	£74,609	£77,358
Scotland Maritime sector	£89,349	£78,492	£92,246	£88,816	£79,011	£91,124	£71,721	£90,598
Shipping	£72,090	£75,912	£86,961	£68,019	£84,723	£86,566	£102,831	£104,254
Ports	£62,627	£59,637	£99,544	£73,091	£78,038	£77,021	£75,874	£88,189
Leisure Marine	£28,665	£28,505	£30,796	£33,063	£33,623	£33,368	£32,471	£32,743
Marine Engineering	£96,858	£81,881	£94,316	£96,439	£78,379	£94,715	£63,036	£87,533
Marine Offshore Oil & Gas	£124,914	£98,107	£114,450	£116,307	£86,839	£111,625	£66,415	£108,747
Other Marine Engineering	£37,246	£49,615	£57,029	£60,486	£62,394	£60,427	£57,796	£53,254
Maritime Business Services	£108,687	£112,336	£121,009	£128,562	£131,809	£111,591	£112,770	£112,886

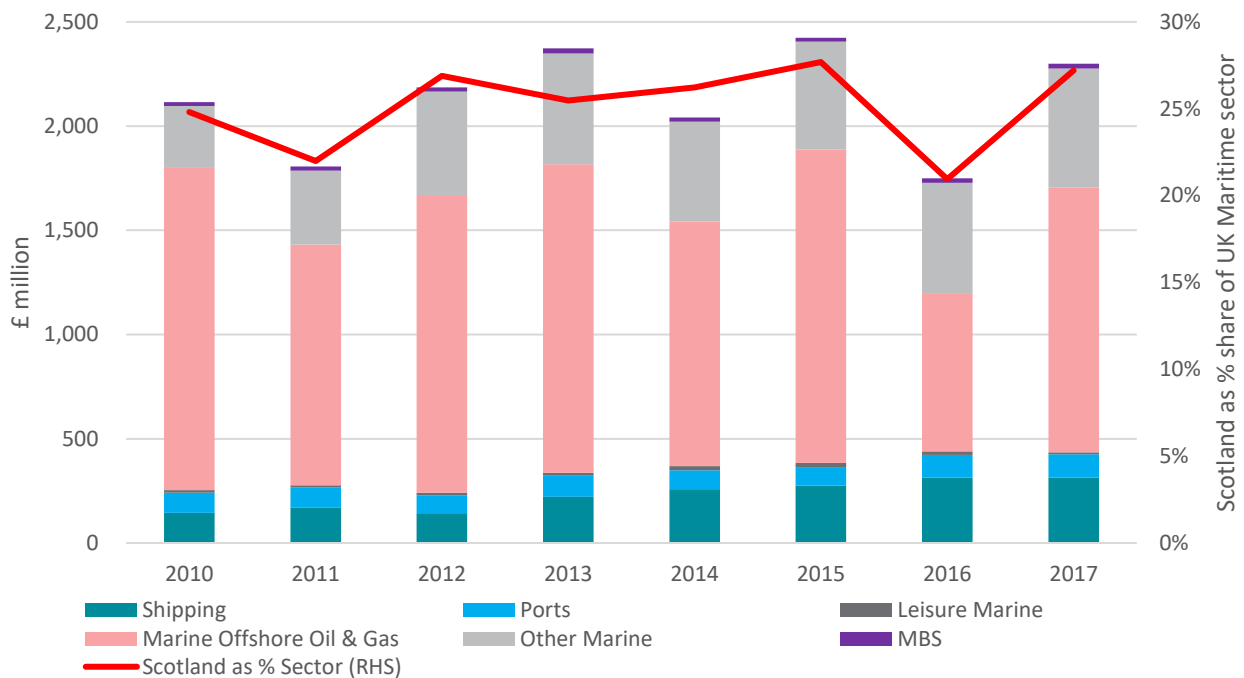
Source: ONS, Cebr analysis

¹¹ Production Engineering Solutions (2019). ['World's most powerful tidal turbine to be made in Dundee.'](#)

3.4 The direct impact through the compensation of employees

This section considers the compensation of employees which is directly supported by the Maritime Sector in Scotland. Figure 6 below shows the direct impact through the compensation of employees in the years 2010 to 2017, disaggregated by each Maritime industry in Scotland.

Figure 6: The direct contribution of the Maritime industries in Scotland to the compensation of employees, and the combined industries' share of the total contribution from the UK Maritime Sector, 2010 to 2017, £ million



Source: ONS, FAME, Cebr analysis

The direct contribution of the Maritime Sector to the compensation of employees was £2.3 billion in 2017; this represented approximately 33% of the direct contribution of the Maritime Sector as a whole in that year.

Consistent with its relatively large direct contribution in GVA, the MES industry contributed 80% of the Scottish sector's direct contribution to the compensation of employees in 2017 equivalent to £1.8 billion. The direct contribution from the MES industry has remained relatively stable under the time period considered, on average contributing £1.8 billion to the compensation of employees. However, in 2016, the MES industry's contribution shrank to £1.2 billion driven by dramatic decrease in Marine Offshore Oil and Gas in line with the global fall in the price of crude oil. The shipping industry has remained the second largest industry throughout the time period considered, and in 2017 the shipping industry directly contributed £300 million to the compensation of employees in 2017.

3.5 The direct Exchequer contribution in Scotland

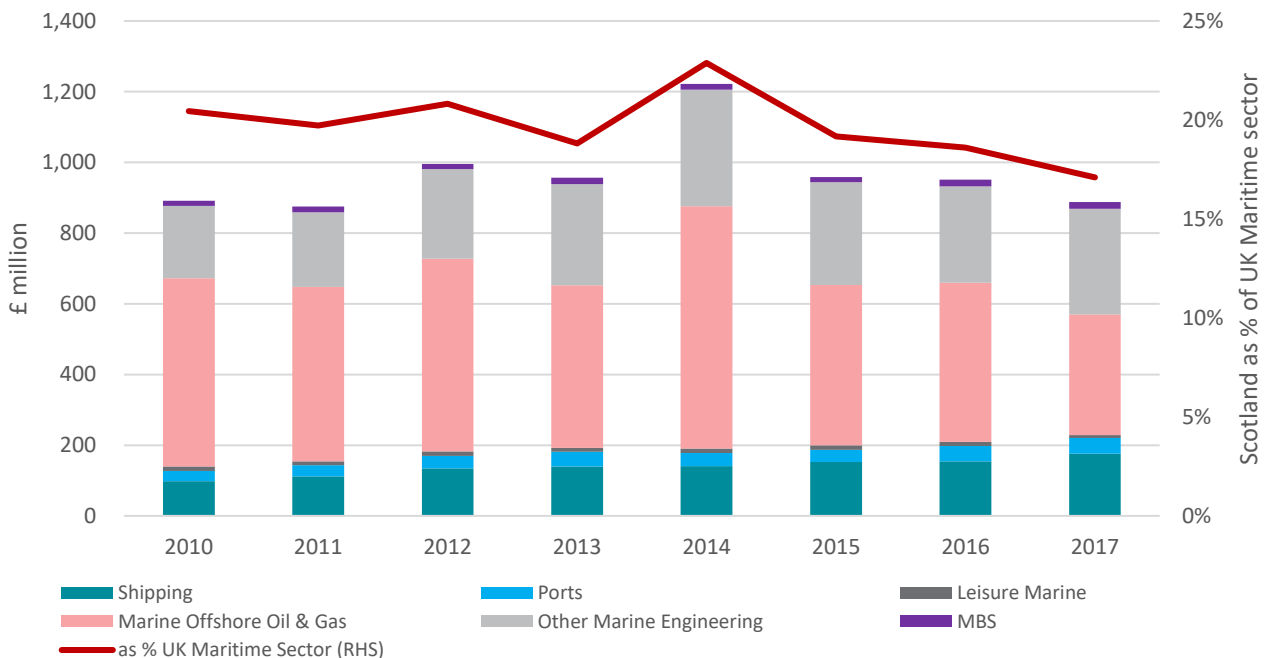
Here we examine the contribution of the Maritime Sector in Scotland to the UK Exchequer, through tax revenues raised from Maritime-related activities. In order to capture the incidence of taxation on the direct activities of the sector, Cebr has measured the contribution through revenues raised from the tax heads listed below:

- Income Tax;
- National Insurance Contributions (NICs) – from both Employer and Employee contributions;
- Value-Added Tax (VAT) as paid by businesses operating in the Maritime sector;
- Corporation Tax;
- National Non-Domestic Rates (Business Rates).

For the personal taxes listed above, Income Tax and NICs revenues have been calculated by applying tax rates to the estimated wages and salaries paid to employees operating in the Scottish Maritime Sector; rates and thresholds have been sourced from HMRC for the years 2010 to 2017. Wages and salaries for employees have been sourced from the Annual Survey for Hours and Earnings (ASHE)¹² and adjusted for wage differentials in Scotland. For the business taxes listed above, Corporation Tax revenues have been estimated by applying HMRC estimates for Average Effective Tax Rates (AETRs) to the estimated Gross Profit of each Maritime industry. Business Rates have been estimated using the average level of Business Rates paid as a proportion of Maritime sector GVA, taken from the ONS Annual Business Survey.

Figure 7 below shows the direct contribution of the Maritime Sector in Scotland to the UK Exchequer in the years 2010 to 2017, and expressed as a share of the total Exchequer contribution from the UK-wide Maritime Sector.

Figure 7: The direct UK Exchequer contribution of the Maritime industries in Scotland, 2010 to 2017, £ million



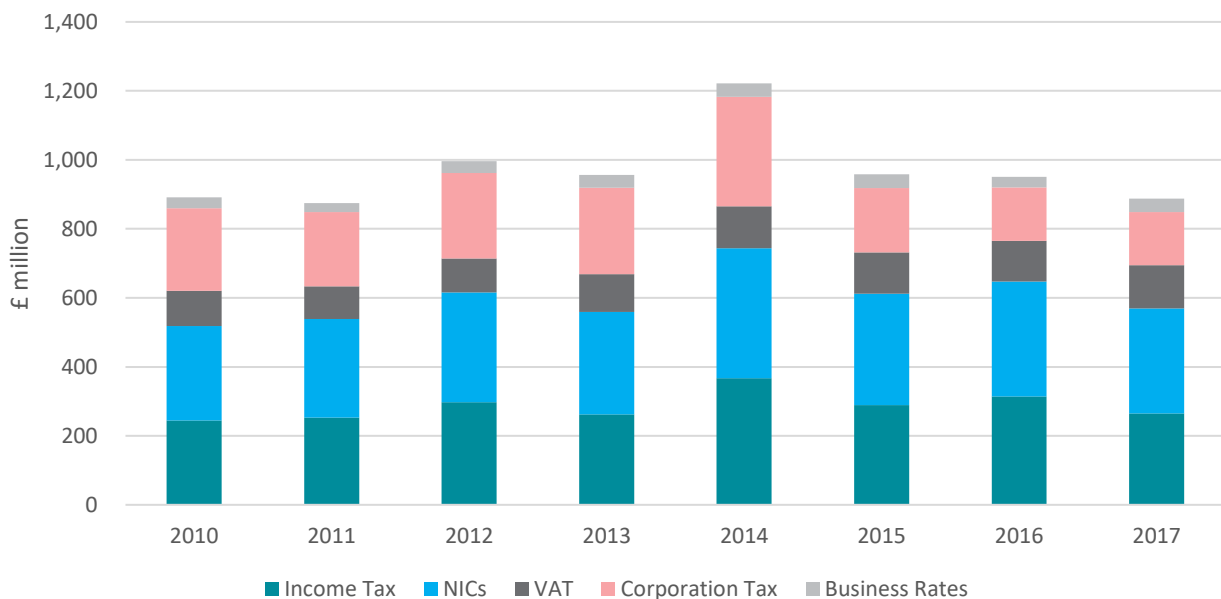
Source: ONS, FAME, Cebr analysis

¹² The Annual Survey of Hours and Earnings (ASHE) provides data on the levels, distribution and make-up of earnings and hours worked for UK employees by sex and full-time or part-time status in all industries and occupations.

The total Exchequer contribution is estimated to have been just under £890 million in 2017; this direct contribution is estimated to have peaked in 2014 at £1.2 billion. On average, this equates to 20% of revenues raised from the entire UK Maritime Sector. This relatively large Exchequer contribution is largely driven by the substantial revenues raised from the Marine Offshore Oil and Gas industry; this is mainly due to the high concentration of this activity's employment being based in Scotland, and the high proportion of Income Tax and NICs revenues yielded as a result.

Figure 8 below disaggregates the direct contribution by tax head across the years 2010 to 2017. For all years considered, the majority of this direct Exchequer contribution has been derived from the Personal Taxes: Income Taxes and NICs contributing £570 million to the Exchequer in 2017.

Figure 8: The direct contribution of the Maritime Sector in Scotland to the UK Exchequer by tax head, 2010 to 2017, £ million



Source: ONS, FAME, Cebr analysis

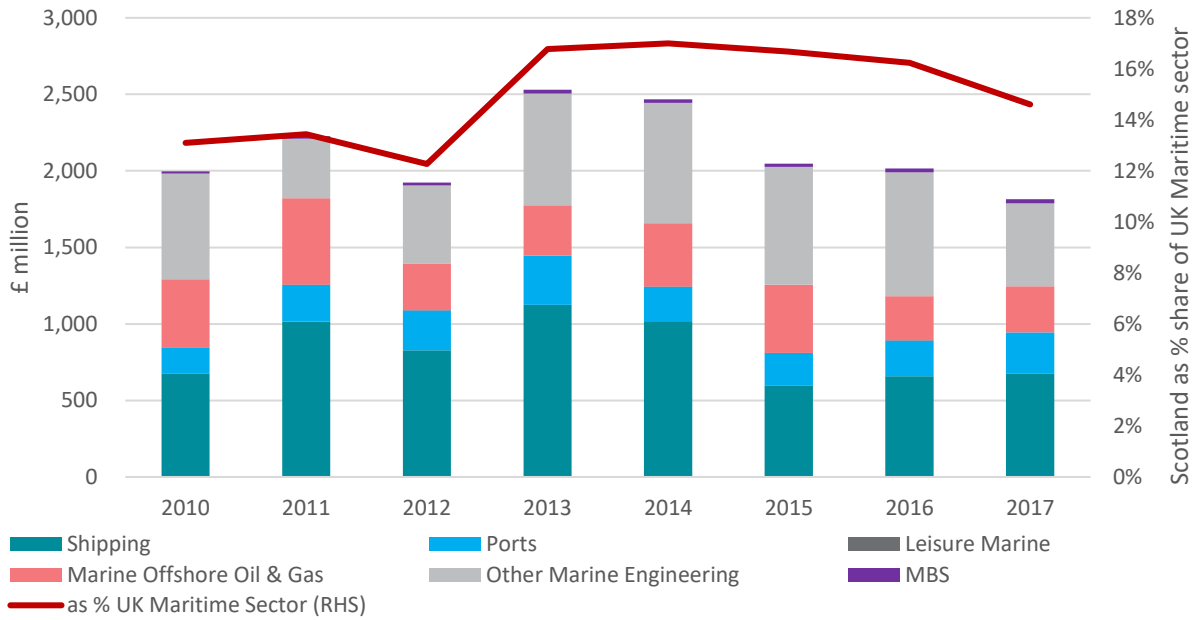
VAT, Corporation Tax and Business Rates are estimated to have jointly contributed around 36% of the total Exchequer contribution in 2017, a decrease from 42% in 2010. Within this corporation tax represented the largest source of tax revenues, contributing £154 million in 2017.

3.6 The direct contribution through exports

Finally, the Maritime Sector in Scotland is also estimated to make a substantive contribution to UK economic activity through the exports of goods and services.

Figure 9 below shows the total estimated value of exports between 2010 and 2017; a total value of £1.8 billion of goods and services were exported in 2017, equating to 14.6% of the UK Maritime sector total. The marine engineering and scientific industry (marine offshore oil and gas and other marine engineering) represented the highest share of exports, at a value of £840 million followed by the shipping industry at £680 million.

Figure 9: The direct contribution of the Maritime Sector in Scotland through exports of goods and services



Source: ONS, FAME, Cebr analysis

4 The aggregate economic impact of the Maritime Sector in Scotland

This final section sets out the aggregate economic impacts of the Maritime Sector in Scotland, taking into account the indirect (or supply chain) and induced (employee spending) impacts that arise from the activities of firms operating within the sector.

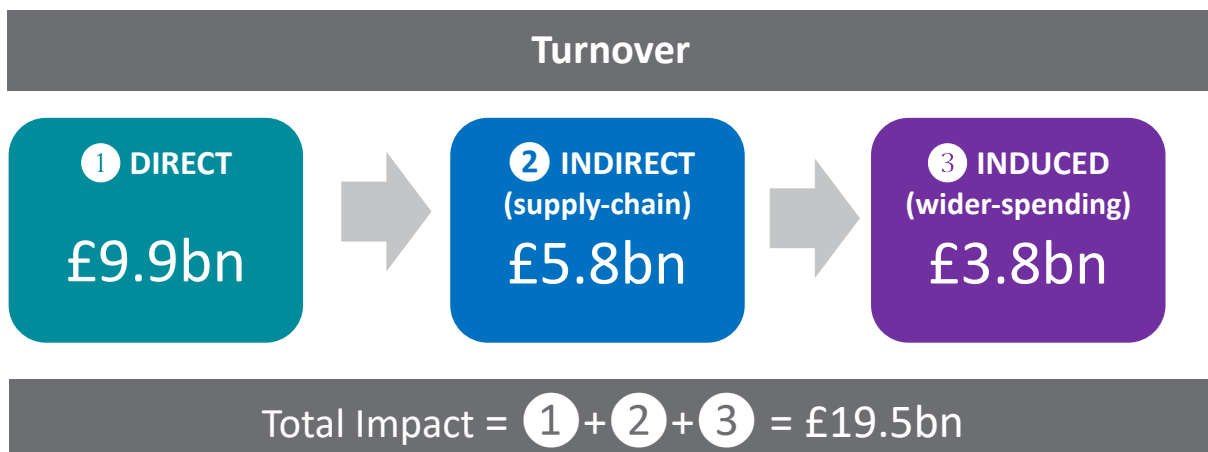
The macroeconomic indicators for which the aggregate economic impact have been calculated are: turnover (through business turnover); GVA; employment; and the compensation of employees. Multipliers have been produced from Cebr's regional economic impact model.

4.1 The aggregate economic impacts through turnover

Figure 10 below illustrates the turnover multipliers for the Maritime Sector in Scotland. The Scottish Maritime Sector directly contributed £9.9 billion in turnover in 2017, where £5.8 billion worth of turnover is stimulated in supply chains and £3.8 billion worth of turnover in the wider economy when direct and indirect employees spend their earnings. Once the direct, indirect and induced economic channels are taken into consideration the Scottish Maritime industry contributed £19.5 billion to the UK economy.

Alternatively, this can be interpreted as for every £1 of turnover initially generated by the Maritime Sector in Scotland, the Scottish and UK economies as a whole experience an increase in turnover of £1.98.

Figure 10: Turnover multiplier impacts of the Maritime Sector in Scotland, 2017



Source: ONS, FAME, Cebr analysis

Table 10 below shows the estimated aggregate turnover impacts from the individual Maritime industries when taken in isolation. The largest direct impact is attributed to Marine Offshore Oil and Gas at approximately £4.5 billion followed by Other Marine Engineering at £2.4 billion and Shipping at £2.3 billion. These three industries also has the largest aggregate impacts.

Table 10: Turnover impact by each Maritime industry in Scotland in 2017, £ million

Turnover in 2017	Direct Impact	Indirect Impact	Induced Impact	Aggregate Impact
TOTAL	9,876	5,843	3,804	19,523
Shipping	2,340	1,853	1,005	5,197
Ports	438	401	221	1,060
Leisure Marine	25	20	12	57
Marine Offshore Oil & Gas	4,464	1,597	1,391	7,451
Other Marine Engineering	2,479	1,874	1,128	5,481
Maritime Business Services	130	99	49	278

Source: ONS, FAME, Cebr analysis

Table 11 below shows the estimated direct and aggregate economic impacts of the Maritime Sector in Scotland across the years 2010 and 2017. As illustrated, both the direct and aggregate impacts are significantly higher in 2017 compared to 2010. However, the direct and aggregate impact peaked in 2014. The composite turnover multiplier remained relatively stable across all years.

Table 11: Direct and Aggregate turnover impact of the Maritime Sector in Scotland, 2010 to 2017, £ million

Year	Direct Impact	Composite domestic output multiplier	Aggregate impact
2010	7,988	1.93	15,442
2011	8,303	1.95	16,228
2012	8,849	1.94	17,195
2013	10,241	1.97	20,137
2014	10,679	1.96	20,937
2015	10,343	1.95	20,177
2016	9,474	1.98	18,735
2017	9,876	1.98	19,523

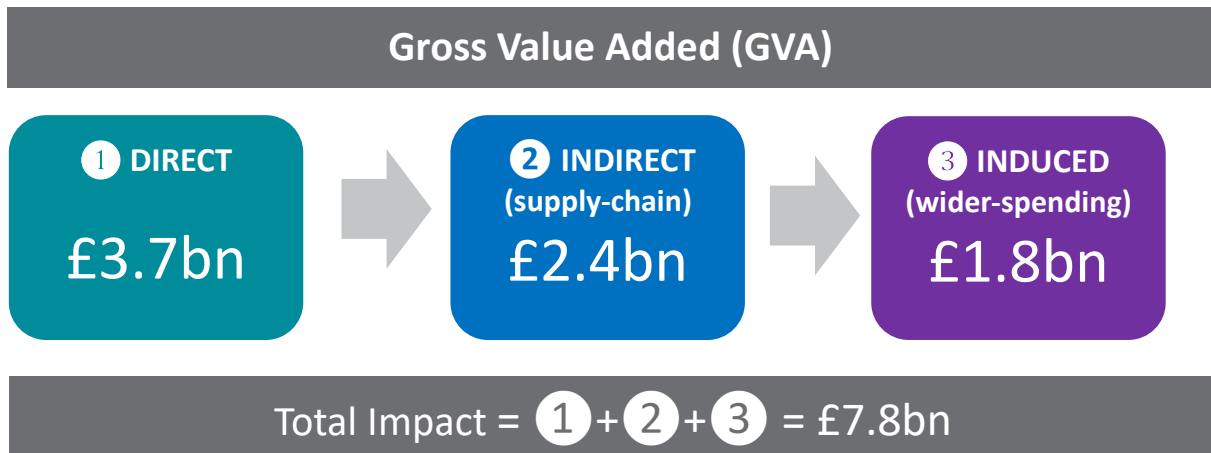
Source: ONS, FAME, Cebr analysis

4.2 The aggregate economic impacts through GVA

Figure 11 below illustrates the GVA multipliers for the Maritime Sector in Scotland. The Scottish Maritime Sector directly contributed £3.7 billion to GVA in 2017, where £2.4 billion worth of GVA is stimulated in supply chains and £1.8 billion worth of GVA in the wider economy when direct and indirect employees spend their earnings. Once the direct, indirect and induced economic channels are taken into consideration the Scottish Maritime Sector contributed £7.8 billion to the UK economy.

This means that for every £1 of GVA initially contributed by the Maritime Sector in Scotland, the Scottish and UK economies as a whole sees an increase in GVA of £2.11.

Figure 11: GVA multiplier impacts of the Maritime Sector in Scotland, 2017



Source: ONS, FAME, Cebr analysis

Table 12 below shows the estimated aggregate GVA impacts from the individual Maritime industries. Once again, the Marine Offshore Oil and Gas industry contributed the most to the direct impacts at £1.9 billion followed by shipping at £0.8 billion. Similarly, the highest aggregate impacts can be identified within the Marine Oil and Gas and Shipping industries.

Table 12: GVA impacts by each Maritime industry in Scotland in 2017

GVA in 2017	Direct Impact	Indirect Impact	Induced Impact	Aggregate Impact
TOTAL	3,714	2,351	1,784	7,849
Shipping	862	911	571	2,343
Ports	238	279	181	698
Leisure Marine	16	15	11	42
Marine Offshore Oil & Gas	1,952	584	580	3,115
Other Marine Engineering	592	509	411	1,512
Maritime Business Services	54	55	30	140

Source: ONS, FAME, Cebr analysis

Table 13 below shows the estimated direct and aggregate economic impacts of the Maritime Sector in Scotland across the years 2010 and 2017. The composite GVA multiplier (reflecting the overall ratio of direct to aggregate impacts) was 2.11 in 2017.

Table 13: Direct and Aggregate GVA impact of the Maritime Sector in Scotland, 2010 to 2017, £ million

Year	Direct Impact	Composite GVA multiplier	Aggregate impact
2010	3,385	2.00	6,779
2011	3,000	2.06	6,168
2012	3,669	2.07	7,587
2013	3,475	2.03	7,050
2014	3,580	2.07	7,395
2015	3,778	2.03	7,674
2016	2,858	2.17	6,216
2017	3,714	2.11	7,849

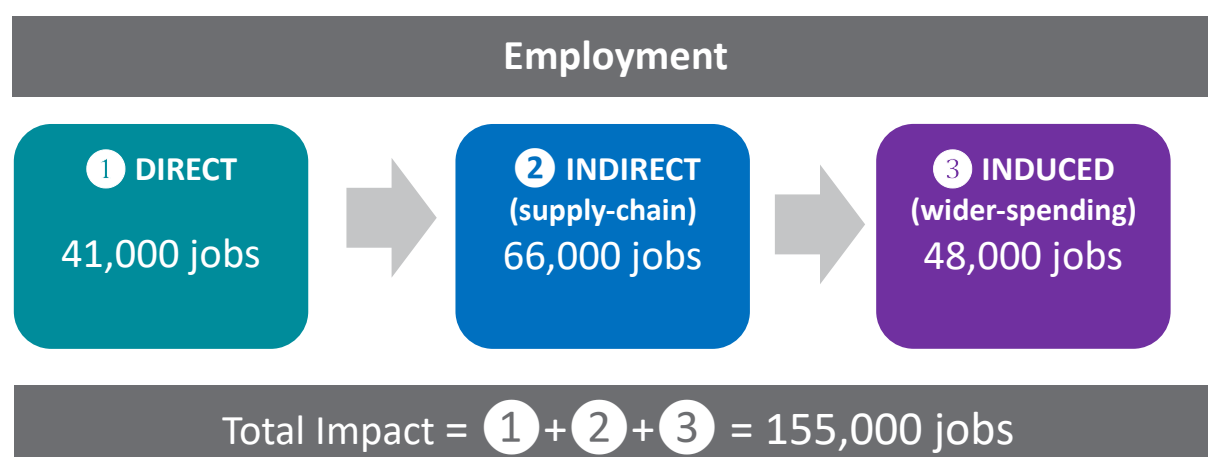
Source: ONS, FAME, Cebr analysis

4.3 The aggregate economic impacts through employment

In this section, we consider the aggregate economic impact that the Maritime Sector in Scotland makes through employment. Figure 12 illustrates the direct, indirect and induced employment impacts associated with the Maritime Sector in Scotland. The number of jobs directly supported by the Scottish Maritime Sector in 2017 was 41,000 jobs, while 114,000 jobs were supported once the indirect and induced impacts of the industry are taken into account. The aggregate employment impact supported by the Scottish Maritime industry was 155,000 jobs in 2017.

Combining each Maritime industry, for every 1 job initially supported by these entities in 2017, a total of 3.79 jobs were therefore supported in the wider Scottish and UK economies.

Figure 12: Employment multiplier impacts of the Maritime Sector in Scotland, 2017



Source: ONS, FAME, Cebr analysis

Table 14 below shows the estimated aggregate GVA impacts from the Scottish Maritime industries taken in isolation. Marine Oil and Gas represents the highest direct impact at approximately 18,000 jobs. However, due to the high economic multipliers associated with the shipping industry, the shipping industry in Scotland makes the largest aggregate economic impact through employment in 2017, with around 90,600 jobs directly and indirectly supported.

Table 14: Employment impact by each Maritime industry in Scotland in 2017, thousands of jobs

Employment in 2017	Direct Impact	Indirect Impact	Induced Impact	Aggregate Impact
TOTAL	40,990	66,448	47,829	155,267
Shipping	8,264	50,637	31,672	90,573
Ports	2,704	2,661	1,387	6,753
Leisure Marine	484	361	224	1,069
Marine Offshore Oil & Gas	17,948	3,203	9,471	30,623
Other Marine Engineering	11,107	8,702	4,682	24,491
Maritime Business Services	482	884	393	1,759

Source: ONS, FAME, Cebr analysis

Table 15 shows how the aggregate employment impact of the Maritime Sector in Scotland is estimated to have evolved since 2017. The composite multiplier in 2017 was 3.79 compared to 3.42 in 2010. Additionally, the aggregate employment impact in 2017, 155,300 jobs, stood higher than the 2010 level of 129,500 jobs.

Table 15: Direct and Aggregate employment impact of the Maritime Sector in Scotland, 2010 to 2017, thousands of jobs

Year	Direct Impact	Composite Employment multiplier	Aggregate impact
2010	37,881	3.42	129,507
2011	38,220	3.62	138,518
2012	39,774	3.69	146,946
2013	39,130	3.62	141,568
2014	45,309	3.56	161,136
2015	41,463	3.51	145,718
2016	39,855	3.77	150,275
2017	40,990	3.79	155,267

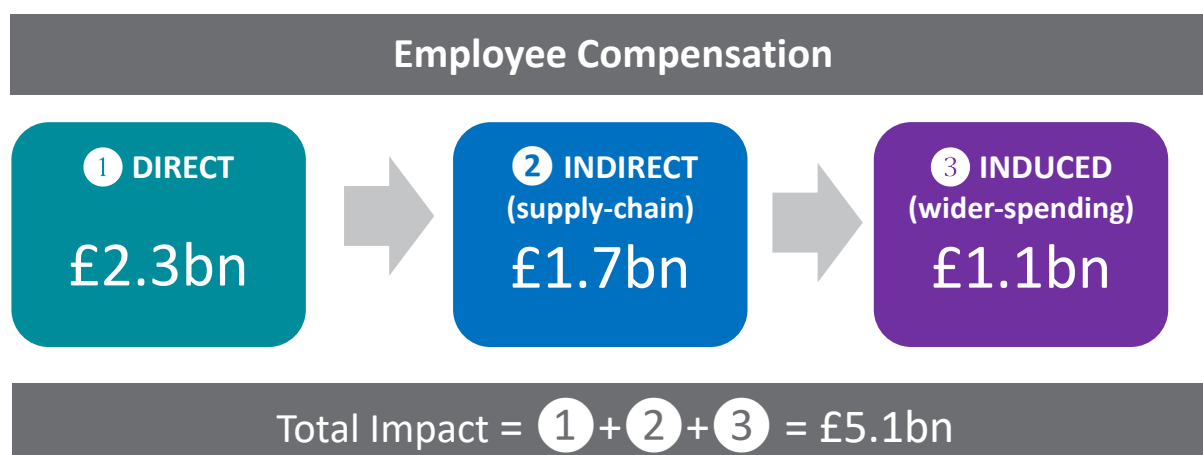
Source: ONS, FAME, Cebr analysis

4.4 The aggregate economic impacts through the compensation of employees

This final subsection sets out the economic impact of the Maritime Sector in Scotland through the compensation of employees. Figure 13 below illustrates the direct, indirect and induced compensation of employee impacts associated with the Maritime sector in Scotland. The direct impact of the compensation of employees from the Scottish Maritime Sector was £2.3 billion in 2017, whereas £1.7 billion of employee compensation is stimulated in the supply chains and £1.1 billion in the wider economy when direct and indirect employees spend their earnings. The total impact of compensation of employees was £5.1 billion.

For every £1 initially contributed by these entities in 2017, a total of £2.21 in employee compensation was supported in the wider Scottish and UK economies.

Figure 13: Employee compensation multiplier impacts of the Maritime Sector in Scotland, 2017



Source: ONS, FAME, Cebr analysis

Table 16 below disaggregates the direct, indirect, induced and aggregate impacts on the compensation of employees by the Maritime Sector in Scotland. The majority of the direct contribution sourced from the Marine Offshore Oil and Gas industry (£1.2 billion) and other Marine industries (£0.6 billion). Unsurprisingly, Marine Oil and Gas and other Marine industries had the highest aggregate impact at £2.6 billion and £1.3 billion respectively.

Table 16: Impact through the compensation of employees by each Maritime industry in Scotland in 2017, £ million

Compensation of Employees in 2017	Direct Impact	Indirect Impact	Induced Impact	Aggregate Impact
TOTAL	2,299	1,688	1,086	5,073
Shipping	314	317	144	775
Ports	111	104	50	265
Leisure Marine	10	7	4	22
Marine Offshore Oil & Gas	1,270	752	643	2,664
Other Marine Engineering	571	477	231	1,279
Maritime Business Services	23	31	13	68

Source: ONS, FAME, Cebr analysis

Table 17 details the direct and aggregate impact through the compensation of employees in each year since 2010. The aggregate impact in 2017 was £5.1 billion compared to £4.6 billion in 2010. The composite multiplier for employee compensation was 2.21 in 2017 compared to 2.18 in 2010.

Table 17: Direct and Aggregate impact through the compensation of employees of the Maritime Sector in Scotland, 2010 to 2017, £ million

Year	Direct Impact	Composite Employee Compensation multiplier	Aggregate impact
2010	2,115	2.18	4,617
2011	1,807	2.19	3,964
2012	2,186	2.18	4,766
2013	2,372	2.19	5,198
2014	2,041	2.20	4,494
2015	2,424	2.19	5,319
2016	1,749	2.23	3,893
2017	2,299	2.21	5,073

Source: ONS, FAME, Cebr analysis

5 Maritime Sector in Scotland: A Forward Look

In this final section of the report we present projections of the Maritime Sector in Scotland for the period 2019-2023. The section starts off by describing the conceptual approach that we have developed to produce projections of the direct economic impacts after 2017 and then present our forecasts of Scottish-based Maritime turnover and GVA over the period 2019-2023.

The Scottish-based Maritime Sector Forecast (2019-2023)

Modelling approach

We investigate the relationship between the maritime economy in Scotland and a number of economic variables through an econometric approach. Our findings show that the maritime economy is primarily linked to Scottish GVA and UK energy (oil and gas) production. After having established the Scottish Maritime economy's elasticities to GDP and energy production, we project these historical relationships forward to produce a forecast of Scottish-based Maritime turnover and GVA. The output of this model constitutes our baseline forecast.

Forecast models rely on macroeconomic variables, for example, GDP, which are generally more suitable for long-term horizon while the focus of our analysis is in the short-medium term (5 years). For this reason, we build on the baseline forecast, introducing more sector-specific assumptions which are used to flex the relation to the drivers previously identified. This approach also enables us to address deterministic expectations about the sector.

To identify the sector-specific assumptions, we drew on our knowledge of the sector composition and on UK-wide maritime trends and themes. Each assumption has been assigned a specific weight reflecting its relevance to the Scottish-based Maritime sector and a set of adjustment factors have been produced.

Applying the adjustments to the baseline forecast, we obtain our central forecast of the Scottish-based Maritime Sector turnover and GVA over the period 2019-2023. To note also that our historical analysis of maritime ends in 2017. This requires us to produce a "now-cast" for the first year (2018) for which we know the actual value of the drivers but not of Scottish-based Maritime Turnover and GVA and a forecast for the following period.

Modelling Assumptions

Scottish GVA

Cebr's macroeconomics department produces regular forecasts of key economic indicators for the UK national, regional and local economies which can directly inform our analysis. We therefore rely on our own projections of the Scottish economy.

Cebr expects Scotland regional GVA to grow at a Compounded Annual Growth rate (CAGR) of 3.2% over 2018-2023 in nominal terms. This rate is lower than the 3.9% CAGR observed during the past 5 years. A high level of uncertainty characterises the forecast as the outcome of Brexit negotiations could easily shift the projections.

Production of energy: Oil & Gas

We rely upon the Oil and Gas Authority (OGA)'s latest projections, which show a constant decline in oil and gas production for the period up to 2035. Energy production can have an ambiguous effect on the Maritime Sector. While it directly contributes to its direct economic impact through what we have defined as "marine engineering and scientific", it can negatively affect trade. An increase in domestic production leads the country to relying less on imported energy, hence implying a reduction in total UK trade. Noting that 25% of

the country's energy supply is imported by ship, a negative relationship between the Maritime economy and energy production can be explained.

Seaborne trade

Seaborne trade represents the main opportunity for the UK Maritime Sector over the near future. We consider both worldwide and UK-specific trade projections within our modelling framework.

Worldwide trends indicate a sustained growth in trade. UNCTAD¹³ sees positive prospects for world seaborne trade forecasting a 3.8% compound annual growth rate between 2018 and 2023 with strongest growth in volumes for containerized and dry bulk commodities. Seaborne trade projections are in line with recent trends showing an average growth rate of 3.5% between 2005 and 2017. These figures are broadly in line with forecasts published by other organisations. DNV GL (an internationally accredited registrar and classification society) projected a 39% increase in seaborne trade tonnage over 2016-2030¹⁴. According to the OECD, global trade is forecast to grow at a higher rate than the economy and specifically a 1% increase in GDP is expected to correspond to a 1.1% growth in seaborne trade (tonnes)¹⁵.

UK prospects are slightly less optimistic than the aforementioned forecasts, as demonstrated by the 2019 DfT's projections of UK port freight traffic covering the years 2017 through to 2050. DfT reports that overall port traffic is forecast to remain relatively flat over the short term, but then grow over the long term, with tonnage 39% higher in 2050 compared to 2016.

Sea passengers

The Maritime Sector also plays a key role in tourism and leisure with nearly 2 million cruise passengers passing through UK ports and more generally in sea transportation of passengers. In 2017, 20 million international ferry passengers travelled on UK short sea routes and 44 million domestic sea passengers.

Using UK GDP as main driver, we projected forward the number of sea passengers obtaining a cumulative growth of 1% over 2018-2023. This figure is in line with historical trends of this sector.

The 2019-2023 forecast

Figure 14 shows the Scottish-based Maritime sector experiencing steady growth over the five year horizon. Our forecast indicates that Scottish-based Maritime turnover and GVA are set to grow at a Compounded Annual Growth rate (CAGR) of 2.6% over the considered period. This translates into a cumulative nominal growth of 14% for 2019-2023, which, when considered alongside projected inflation, is about 4%.

The projected growth is lower than what experienced over the period from 2010 to 2017. We note however that, after a period of sustained growth up to 2014, the Maritime Sector in Scotland has slowed down experiencing negative rates of growth in 2015 and 2016.

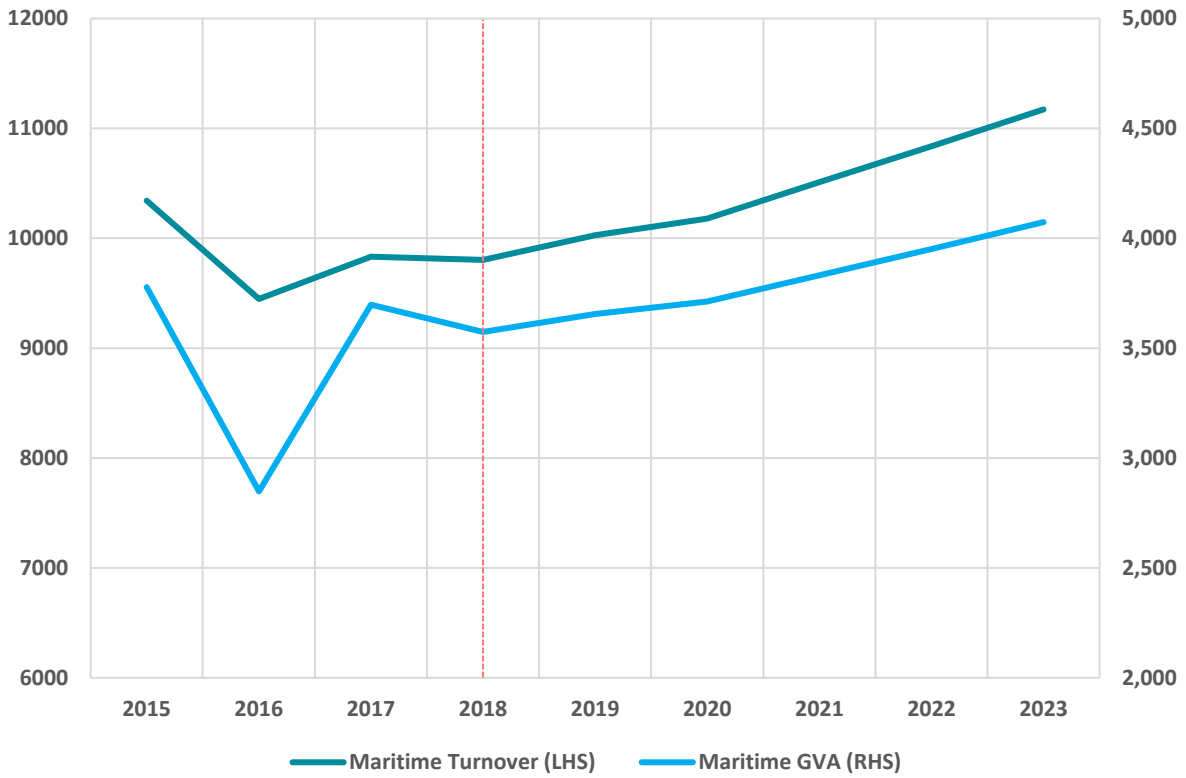
Overall, the forecast for the Scottish-based Maritime Sector is in line with projections of the national Maritime economy.

13 United Nations Conference on Trade and Development. (2018). ['Review of Marine Transport 2018'](#).

14 DNV GL (2018). ['Energy Transition Outlook'](#).

15 OECD. (2018). ['Growth prospects, challenges and uncertainties for selected ocean industries'](#).

Figure 14: Scottish-based maritime sector turnover and GVA trends and projections, £ million, 2015 to 2023



6 Case Study: Anglo Eastern and the Scottish Maritime Cluster

Anglo Eastern is a maritime consultancy and global ship management company. Established in 1974 in Hong Kong, the company has expanded to become one of the world's largest ship management companies with 25 offices worldwide.¹⁶ Anglo Eastern's current operations include complete third-party management of 600 vessels – 300 bulk carriers, 200 tankers and 100 container ships – and employ 27,000 seafarers and 1,700 shore staff.¹⁷

Anglo Eastern is globally renowned for its training and commitment to the career goals of seafarers. It operates dedicated training centres in India, the Philippines, China and Ukraine which offer courses such as cadet training, cargo operations, engineering, nautical institute accreditations and environmental management.¹⁸ In addition to this, Anglo Eastern also offer over 50 courses for experienced officers to upgrade their skills beyond the mandatory requirements with the intention to maintain Anglo Eastern as one of the front runners of ship management.¹⁹

Anglo Eastern's services are significant, they provide third party management of bulk carriers, container ships, tankers, offshore vessels and semi-submersibles. In addition to this, they also deliver technical services such as conceptual design and new build supervision.²⁰ However, Anglo Eastern is not solely a business operator, but also provides services within the Leisure Marine sector focusing on yacht management. This emphasises that Anglo Eastern is a broad maritime company encompassing Shipping, Leisure Marine and Marine Engineering and Scientific industry and Maritime Business Services.

Anglo Eastern's UK office is based in Glasgow and is slightly differentiated from the parent company in that it is 'Anglo Eastern Offshore'. Anglo Eastern Offshore's operations includes the broad ship management the company is renowned for, but also offers services in consultancy in offshore markets.²¹ This additional consultancy focuses on the oil and gas industry and renewable energies.

Anglo Eastern's UK office, focusing on the additional consultancy of oil, gas and renewables, is well suited within Scotland. In 2017, 89% of the UKs support activities in Oil and Gas were situated within Scotland. Moreover, a 2013 governmental study on the low carbon economy found that 15% of offshore wind employees and 32% of marine renewables employees were located in Scotland,²² emphasising the regions importance to the renewables sector.

More recently, the Managing Director of Anglo Eastern Offshore in Glasgow has, along with a range of other maritime companies, formed the Scottish Maritime Cluster. This organisation currently has over 40 members within the maritime sector and its aim is to enhance Scotland's global maritime market share.²³ The focus of this organisation is on commercial shipping, military contracts, maritime business services, legislation and training.

Scotland is currently the UKs second largest maritime cluster, providing significant resources to the UK maritime industry. The Scottish Maritime Cluster organisation is hoping to provide a way to enhance opportunities for the region and drive economic growth for the industry as a whole. A key objective for the

¹⁶ Lloyds List. (2018). 'Top 10 shipmanagers 2018'.

¹⁷ Anglo Eastern. (2019). 'Setting the standard'.

¹⁸ Anglo Eastern. (2019). 'Anglo Eastern Maritime Training Centre'.

¹⁹ Anglo Eastern. (2019). 'Training'.

²⁰ Anglo Eastern Offshore. (2019). 'About Anglo Eastern'.

²¹ Ibid.

²² UK Government. (2013). 'Low-carbon economy: size and performance'.

²³ Scottish Maritime Cluster. (2019). 'About Us'.

Scottish Maritime Cluster is to expand membership to beyond traditional maritime companies so as to bring in new expertise and skills to the sector.²⁴

The Scottish Maritime Cluster's objectives align with the government's broader Maritime 2050 goals. The government is particularly keen on maintaining the UK's competitive advantage within the maritime sector in terms of training, its fiscal regime and the business services it provides.²⁵ Institutions like the Scottish Maritime Cluster and Anglo Eastern who are stimulating these areas will be key players in the UK's objective to maintain its position as one of the strongest maritime hubs globally.

²⁴ Scottish Maritime Cluster. (2019). 'Membership.'

²⁵ Department for Transport. (2019). 'Maritime 2050: navigating the future'.

7 Annex: List of Scottish ports

Table A.1: List of major and minor ports in Scotland considered as part of the study

Port	Council Ward	Postcode
Aberdeen	George St / Harbour	AB11 5SS
Ardrishaig	Mid Argyll	PA30 8DZ
Ayr	Ayr North	KA8 8AH
Barra Castlebay	Barraigh, Bhatarsaigh, Eirisgeigh agus Uibhist a Deas	HS9 5XD
Buckie	Buckie	AB56 1UN
Burghead	Heldon and Laich	IV30 5UA
Burntisland	Rosyth	KY11 2XP
Cairnryan	Wigtown West	DG9 8RF
Castlebay	Barraigh, Bhatarsaigh, Eirisgeigh agus Uibhist a Deas	HS9 5XD
Clyde	Anderston/City	G2 8DS
Corpach	Caol and Mallaig	PH33 7NN
Craignure	Oban South and the Isles	PA34 4PF
Cromarty Firth	Cromarty Firth	IV18 0HD
Cullivoe (Yell)	Shetland North	ZE2 9QR
Dundee	Maryfield	DD1 3HW
Fairlie Quay	North Coast and Cumbraes	KA29 0AS
Forth	-	-
Fraserburgh Harbour	Fraserburgh and District	AB43 9BR
Gairloch	Wester Ross, Strathpeffer and Lochalsh	IV21 2BQ
Garlieston	Mid Galloway	DG8 8BQ
Gill's Bay Scotland	Landward Caithness	KW1 4YB
Girvan	Ayr West	KA7 1EA
Glensanda	Oban North and Lorn	PA37 1SL
Grangemouth	Grangemouth	FK3 8UE
Helmsdale	East Sutherland and Edderton	KW8 6JZ
Inverkeithing	Dunfermline Central	KY11 1HR
Inverness	Inverness Millburn	IV1 1SU
Irvine	Irvine West	KA12 8PZ
Isle of Whithorn	Mid Galloway	DG8 8LL
Kinlochbervie	North, West and Central Sutherland	IV27 4RR
Kirkcaldy	Kirkcaldy East	KY1 2TD
Kirkcudbright	Dee	DG6 4HY
Kishorn Quay	Caol and Mallaig	PH33 7NN
Kyle of Lochalsh	Wester Ross, Strathpeffer and Lochalsh	IV40 8AQ
Leith	Leith	EH6 7DX
Lerwick	Lerwick North	ZE1 0LL
Lochaline	Oban South and the Isles	PA65 6BA

Table A.1: List of Scottish ports considered as part of the study (cont.)

Port	Council Ward	Postcode
Lochboisdale	Barraigh, Bhatarsaigh, Eirisgeigh agus Uibhist a Deas	HS8 5TP
Lochinver	North, West and Central Sutherland	IV27 4JP
Lochmaddy	Beinn na Foghla agus Uibhist a Tuath	HS7 5LA
Lossiemouth	Heldon and Laich	IV31 6TW
Macduff	Troup	AB44 1TX
Marine Resource Centre	Oban North and Lorn	PA37 1SE
Methil	Buckhaven, Methil and Wemyss Villages	KY8 3RE
Montrose	Montrose and District	DD10 9SL
Oban	Oban South and the Isles	PA3 LS
Orkney Islands Council	Kirkwall West and Orphir	KW15 1SD
Perth Harbour	Perth City Centre	PH2 8BB
Peterhead	Peterhead North and Rattray	AB42 1DX
Port Askaig	Mid Argyll	PA31 8RT
Port William	Wigtown West	DG8 9SE
Portree	Eilean a' Chèo	IV51 9DE
Rosyth	Rosyth	KY11 2XP
Scalloway	Shetland Central	ZE1 0TQ
Scrabster	Thurso	KW14 7UJ
Stornoway	Steòrnabhagh a Deas	HS1 2XS
Stranraer West Pier	Dumfires and Galloway	DG9 8RA
Sullom Voe	Shetland North	ZE2 9QR
Tarbert	Na Hearadh agus Ceann a Deas nan Loch	HS3 3DF
Tayport	Tay Bridgehead	DD6 9AJ
Troon	Troon	KA10 6DX
Uig	Eilean a' Chèo	IV51 9XX
Whitehills Harbour	Banff and District	AB45 2NQ
Wick	Wick	KW1 5HB

Source: Department for Transport, Cebr analysis