

Ireland's Ocean Economy

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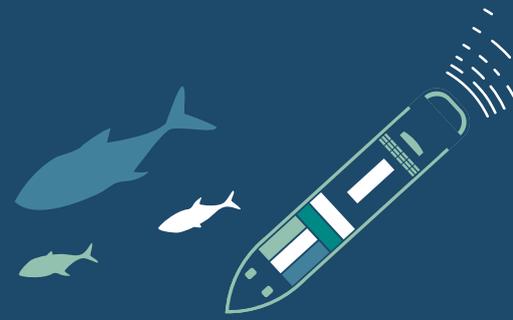
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SEMURU

The Socio-Economic Marine Research Unit (SEMURU) at NUI Galway has been commissioned under the Marine Research Sub-Programme PBA/SE/16/01 to report on the performance of Ireland's ocean economy. The focus is not only on continuing to collect reliable and comparable marine socio-economic data across all the marine sectors, but also to satisfy one of the specific core tasks for SEMURU, namely to develop a methodology which will provide reliable estimates of the economic contribution of the marine sector and its growth over time.

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Executive Summary

Reliable socio-economic marine data is essential if policy makers are to use an evidence based approach to foster development of our ocean related industries. It is also vital if Ireland is to utilise its substantial marine resources in a manner that, as envisioned under the EU Blue Growth Strategy and Ireland's Integrated Marine Plan, ensures a healthy marine environment and the continued delivery of marine ecosystem services to Irish society.

With that in mind, this report provides a detailed analysis of Ireland's ocean economy over time and presents a complete and comparable profile across thirteen marine related industries, which allows us to observe progress on the targets set out in the Government's Integrated Marine Plan for Ireland - Harnessing Our Ocean Wealth (2012). The report includes a set of economic projections that forecast Ireland's ocean economy up to 2018. It also provides a profile of Ireland's coastal economy using Census of Population Small Area Statistics.

THIS REPORT AIMS TO:

- Provide a profile of Ireland's ocean economy for 2016 and 2018;
- Provide estimates for turnover, Gross Value Added¹ (GVA) and employment for the 2010-2018 period;
- Assist in monitoring progress of a number of targets set out in the Government's Integrated Marine Plan
- Provide an overview of the policy environment and outlook of the sector where appropriate;
- Provide an analysis of trends in each ocean industry in the 2008-2018 period.

In 2018, Ireland's ocean economy had a turnover of €6.2 billion. The direct economic contribution, as measured by GVA was €2.2 billion or 1.1% of GDP. Ireland's ocean economy provided employment for 34,132 FTEs. Compared to 2016, 2018 saw a 13% increase in turnover, a 11% increase in gross value added (GVA) and a 13% increase in employment.

The indirect GVA that is generated from ocean related activity in Ireland in 2018 amounts to a €1.96 billion, with a total GVA (direct and indirect) of €4.19 billion, which represents 2% of GDP.

¹ Gross value added is the value of output less the value of intermediate consumption and it is a measure of the contribution to GDP made by an individual producer, industry or sector.

This report is divided into two broad types of marine industries:

The Established Marine Industries in 2018 had an estimated turnover of €5.8 billion and provided employment of 32,048 FTEs representing 93% of the total turnover and 94% of total employment in Ireland's ocean economy. This sector includes shipping and maritime transport, tourism and leisure in marine and coastal areas, international cruise, sea fisheries, marine aquaculture, seafood processing, oil and gas exploration and production, marine manufacturing, construction and engineering and marine retail services.

International cruise, oil and gas exploration and production, and marine manufacturing, construction and engineering experienced the largest increases in economic activity over the 2016-2018 period.

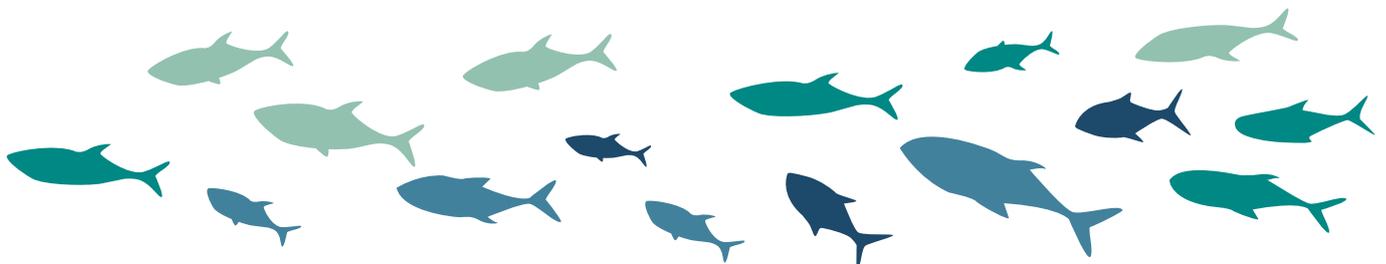
The Emerging Marine Industries in 2018 had an estimated turnover of €459 million and provided estimated employment to 2,084 FTEs representing 7% of the turnover and 6% of employment in Ireland's ocean economy. Emerging industries refer to those that are still at a relatively early stage of development, and are primarily R&D intensive and/or use the latest cutting edge technology in their pursuit of economic growth. Ireland's ocean economy emerging industries includes advanced marine technology products and services, marine commerce, marine biotechnology and bio-products and marine renewable energy.

Marine commerce and the marine biotechnology and bio-products industries experienced the largest increases in turnover and GVA in the 2016-2018 period. The marine renewable energy and the advanced marine technology products and services industries saw a decline in both turnover and GVA over the same period. On aggregate employment experienced a 7% increase across the emerging industries in the 2016-2018 period.

THE OCEAN ECONOMY - DEFINITION

The ocean economy is defined as any economic activity that directly or indirectly uses the sea as an input or produces an output for use in a sea-specific activity.

The coastal economy, on the other hand, represents all economic activity that takes place in the coastal region, which is not necessarily part of the ocean economy.



IRELAND'S OCEAN ECONOMY 2018

DIRECT IMPACT

(SEMURU, UPDATE JUNE 2019)



34,130
EMPLOYEES



€6.23 BN
TURNOVER



1.16%
% GDP



€2.23 BN
GVA

TOTAL (DIRECT & INDIRECT)



	2016 (Actual)	2018 (Estimate)	HOOW Targets	% Change 2014-2016 (Actual)	% Change 2016-2018 (Estimate)
GVA	€2.00bn	€2.23bn		33%*	11%**
Employment (FTEs)	30,208	34,132		10%	13%***
% GDP (Direct)	0.9%	1.1%			
% GDP (Direct & Indirect)		2%	2.4% (2030)		
Turnover	€5.52bn	€6.23bn	€6.4bn (2020)	18%	13%

* National growth over the period estimated at 16% (GNI)
 ** National growth over the period estimated at 10%
 *** National employment growth over the period estimated at 3%



Ireland's marine
territory covers
an area of
880,000km²

Introduction



This report is the fifth in the series produced by the Socio-Economic Marine Research Unit (SEMRU) at the National University of Ireland Galway. The four previous reports examined the economic value of Ireland's ocean economy using 2007, 2010, 2012 and 2014 data respectively. This report builds on those previous ones by profiling and analysing Ireland's ocean economy in the 2016 to 2018 period. While the latest data available for a number of the industries is 2016 this report presents economic estimates for the years 2017 and 2018 for those industries where more recent data was not available.

In addition, this report also profiles the socio demographic profile of Ireland coastal economy and in recognition of the importance of Ireland's oceans for the delivery of marine ecosystem services to Irish society it also presents the results from a recent SEMRU report that estimated the value of a range of marine ecosystem service benefits. Accounting for these services and how they change as the ocean economy grows is vital to ensure 'blue growth', i.e. ensuring the "development of marine economic activities in such a manner that the long term ability of the marine environment to continue to provide ecosystem service benefits is not compromised"².

As in previous years the data is used to examine the progress of the ocean economy in terms of the targets set out by the Irish Government in *Harnessing Our Ocean Wealth – an Integrated Marine Plan (IMP) for Ireland* and shown in Table 1. Published in 2012, the IMP presents "the Government's vision, high-level goals and integrated actions across policy, governance and business to enable Ireland's marine potential to be realised"³.

HARNESSING OUR OCEAN WEALTH TARGETS

(Baseline year for targets: 2007)

Double the value of Ireland's ocean wealth to 2.4% of GDP by 2030

Increase the turnover from Ireland's ocean economy to exceed €6.4bn by 2020

Source: Government of Ireland, Inter-Departmental Marine Coordination Group (MCG), *Harnessing Our Ocean Wealth - An Integrated Marine Plan (IMP) for Ireland*, July 2012

Table 1: Sectoral Targets set out in Harnessing Our Ocean Wealth

Sector	2020 Target*
Seafood (fisheries, aquaculture, seafood processing)	€1,000 million
Maritime Commerce and Ship Leasing	€2,600 million
Marine and Coastal Tourism and Leisure (including Cruise Tourism)	€1,500 million
Marine ICT and Biotechnology	>€61 million
Ports and Maritime Transport Services, Maritime Manufacturing, Engineering, Offshore Oil and Gas, other marine industries	>€1,200 million

Source: *Harnessing our Ocean Wealth – An Integrated Marine Plan for Ireland*; *Projected Annual Turnover by 2020. Baseline period: 2007

² Norton, D., Hynes, S. and Boyd, J. (2018). EPA Research Report No 239: Valuing Ireland's Coastal, Marine and Estuarine Ecosystem Services, EPA Publications, Wexford.

³ Government of Ireland, Inter-Departmental Marine Coordination Group (MCG), *Harnessing Our Ocean Wealth - An Integrated Marine Plan (IMP) for Ireland*, July 2012.

The overarching aim of this report is to assist policy making by providing a profile of Ireland's Ocean Economy in the 2008-2018 period and industry-by-industry economic projections for the 2016 to 2018 period against which future marine socio-economic data can be compared. Data is also being provided to support the implementation of the EU Marine Strategy Framework Directive (MSFD) and the Maritime Spatial Planning (MSP) Directive in Ireland. The ocean industry data, coupled with the coastal economy statistics and the marine ecosystem service benefit values provides important information that can also contribute in achieving the UN Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

The methodology used in compiling this report on Ireland's ocean economy is the same as that used in previous reports. The reference year, the latest year for which data is available from the Central Statistics Office (CSO) for a number of the industries looked at is 2016. There is a two-year time lag in the release of Structural Business Statistics (SBS) from the CSO. However, more up-to-date data is available for some sectors such as sea fisheries and marine aquaculture. To allow for a complete and comparable representation of Ireland's ocean economy across all sectors, the report presents estimates based on economic projections of Ireland's ocean economy up to 2018. These estimates are based on a forecasting exercise of the economic performance of a number of industries. The methodology used combines the latest published economic data from the CSO, government economic forecasts and expert judgment information obtained from interviews with marine-related businesses and relevant government departments and agencies. Details on the methodologies used for the economic projections are presented in the Appendix.

Figures presented in Table 2 suggest that Ireland's ocean economy continues to perform better, on average, than the general economy. While growth in the Irish economy from 2014 to 2016 was approximately 16%, the ocean economy grew by 33% in the same period. This was mainly driven by an upsurge in shipping and marine tourism activity and the coming on line of the Corrib Gas terminal. Estimates suggest that GVA growth rates in Ireland's ocean economy for the 2016-2018 period was approximately 11%, which is now just marginally above the recent increase of 10% in Ireland's GDP for the same period⁴.

Table 2: The Irish Ocean Economy key figures and trends, 2014, 2016 and 2018

	2014	2016	% Change 2014-2016	2018	% Change 2016-2018
GVA	€1.49 billion	€2.00 billion	33%	€2.23 billion	11%
% GDP	0.9% GDP	0.9% GDP		1.1% GDP	
Turnover	€4.65 billion	€5.52 billion	18%	€6.23 billion	13%
Employment	27,391 FTEs	30,208 FTEs	10%	34,132 FTEs	13%

⁴ Modified GNI at current market prices (GNI*) from the CSO was used as the measure of economic growth year on year. GNI* is an indicator that was recommended by the Economic Statistics Review Group and is designed to exclude globalisation effects that are disproportionately impacting the measurement of the size of the Irish economy when using standard GDP.



Indirect Gross Value Added

The production economy can be viewed as a cyclical system of product and services flows between producers and consumers. Industries utilize factors of production (inputs), such as labour, capital, natural resources, and technology to produce goods and services that can be directly sold to consumers as final products (outputs) or sold to other industries where they will be further used as inputs for the production of other products.

These economic/production flows are recorded in input-output tables according to product and industry classifications. Input-output tables are often used to understand the structural interdependencies between industries, tracing input requirements for each product back through the production cycle. Moreover, input-output tables are used to calculate output, employer and GVA multipliers.

SEMRU in collaboration with Teagasc (Agriculture and Food Development Authority) developed a Bio-Economy Input-Output (BIO) model for Ireland. The BIO model allows for the analysis of linkages between the bio-economy industries and industries within the wider economy. Marine-related industries represent a vital element of the bio-economy. The BIO model encompasses established and emerging marine industries allowing for the assessment of impacts of economic activities involving marine resources on the wider economy.

Table 3: Direct and Indirect GVA, 2018

Sector	Direct GVA (€'000)	Indirect GVA (€'000)	Direct and Indirect GVA (€'000)
Shipping & Maritime Transport	697,210	990,038	1,687,249
Tourism and leisure in Marine and Coastal Areas	648,440	382,580	1,031,020
International Cruise	20,339	11,999	32,338
Marine Retail Services	74,534	32,795	107,329
Sea Fisheries	173,000	53,630	226,630
Marine Aquaculture	100,320	39,125	139,445
Seafood Processing	161,129	203,022	364,151
Oil and Gas Exploration and Production	106,470	56,429	162,899
Marine Manufacturing, Construction and Engineering	67,888	69,925	137,812
Marine Advanced Technology Products and Services	41,868	43,124	84,991
Maritime Commerce	67,704	29,790	97,494
Marine Biotechnology and Bio-products	29,767	30,660	60,427
Marine Renewable Energy	37,187	19,709	56,896
Total	2,225,856	1,962,826	4,188,681

The BIO model is used to examine the direct and indirect effects of a change in the final demand for the output of a marine industry on GVA. The direct effect captures the change in GVA of the marine industry of interest due to a change in the final demand for its output. The indirect effect captures the change in GVA in the entire production chain required to support the production of an additional unit of final output of the marine industry of interest and its suppliers of intermediate inputs.

As shown in Table 3, Ireland's estimated total direct GVA in 2018 was €2.23 billion, indirect GVA was €1.96 billion and total GVA (direct and indirect) was more than €4.19 billion. Harnessing Our Ocean Wealth (HOOW) - An Integrated Marine Plan for Ireland set out a target to double the value of Ireland's ocean economy (both direct and indirect) to 2.4% of GDP by 2030. The estimated direct and indirect GVA of €4.19 billion represents 2% of GDP. This has increased only very marginally in the last number of years. The fact that it is increasing is noteworthy as GDP in the wider economy has also been growing strongly albeit at a slightly slower pace than the ocean economy.



A Profile of Ireland's Ocean Economy

Ireland's ocean economy had a turnover⁵ of €5.5 billion in 2016, of which €2 billion was direct gross value added (GVA)⁶. The Irish marine sector employed 30,208 FTEs. Ireland's total output, as measured by Modified Gross National Income, in 2016 was approximately €189 billion. The direct GVA from marine economic activity is therefore approximately 1% of national output. In 2018 Ireland's ocean economy had an estimated turnover of €6.2 billion and provided estimated employment to 34,132 FTEs.

The established industries in Ireland's ocean economy account for 93% of total marine turnover. This category is dominated by both shipping and maritime transport, as well as tourism and leisure in marine and coastal areas (Table 4). As observed in previous reporting periods, shipping and maritime transport continue to be the largest contributor in terms of turnover and value added in 2016. Tourism and leisure in marine and coastal areas is the next largest category overall and is the largest contributor with regards to employment.

Within the emerging marine industries, marine advanced technology and marine commerce make the largest contribution in terms of turnover and value added in 2016. The marine advanced technology products and services category along with the marine biotechnology sector is also an important category in terms of employment. The spatial distribution of enterprises and employment in Ireland's ocean economy is shown in Figure 1.

Overall the top three performing industries in Ireland's ocean economy in terms of value and employment are shipping and maritime transport, tourism and leisure in marine and coastal areas, and seafood (fisheries, aquaculture and processing combined).

Table 4: Direct Turnover, GVA and Employment by industry, 2016

2016	Direct Turnover € Millions	Direct GVA € Millions	Direct Employment (FTEs)
Established Industries			
Shipping and Maritime Transport	2,095.58	638.47	4,629
Marine Tourism and Leisure	1077.98	557.54	15,905
International Cruise Industry	25.94	9.76	...
Marine Retail Services	159.02	70.96	810
Sea Fisheries	303.67	164.50	2,536
Marine Aquaculture	167.17	98.40	1,030
Seafood Processing	602.29	172.15	2,429
Oil and Gas Exploration and Production	597.28	71.67	145
Marine Manufacturing, Construction and Engineering	107.61	60.98	779
Established Markets Sub-Total	5,136.53	1,844.44	28,263

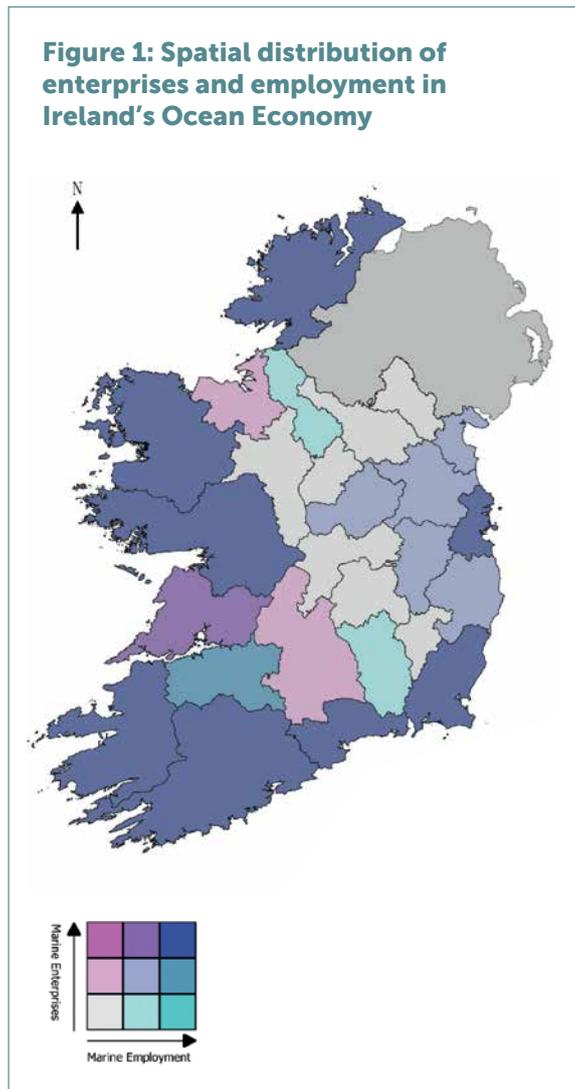
⁵ Turnover is the value of sales

⁶ GVA refers to a sector's turnover (output) minus intermediate consumption (the inputs into the production process). It is measured at basic prices, excluding taxes less subsidies on products.

Table 4: Direct Turnover, GVA and Employment by industry, 2016 (continued)

2016	Direct Turnover € Millions	Direct GVA € Millions	Direct Employment (FTEs)
Emerging Industries			
Advanced Marine Technology Products and Services	139.68	60.63	695
Marine Commerce	140.73	41.76	342
Marine Biotechnology and Bio-products	43.61	16.99	453
Marine Renewable Energy	59.00	38.10	454
Emerging Markets Sub-Total	383.02	157.48	1945
Total	5,519.55	2,001.20	30,208

The overall turnover of Ireland's ocean economy in 2016 was €5.5 billion, an increase of 18% on 2014. GVA and employment increased by 33% and 10%, respectively, over the same period. Tables 5-7 show the direct turnover, GVA and employment by sector from 2010 to 2018. Estimates for the 2016-2018 period suggest an overall increase in turnover of 13% to €6.2 billion, with a comparable increase in GVA and employment of 11% and 13% respectively over the same period.



Turnover in the traditional, established marine industries increased from €4.4 billion to €5.1 billion in the 2014-2016 period. This represented a 17% increase, and was mainly driven by significant increases in shipping and maritime transport, marine tourism, oil and gas production and exploration, and marine aquaculture. Employment in the established industries category rose from 25,670 FTEs in 2014 to 28,263 in 2016, an increase of 10%. Estimates for the established marine industries suggest that in 2018, turnover increased to €5.8 billion, an increase of 12% on 2016. Estimates show an increase of 11% in GVA to €2.05 billion and an increase of approximately 13% in employment to 32,048 FTEs in the established industries in the 2016-2018 period (See Tables 5-7).

Turnover of firms in the emerging marine industries also increased from €275 million to €383 million in the 2014-2016 period, an increase of 39%. GVA in the emerging industries category experienced an increase of 60%, while employment increased by 13%. Estimates for the 2016-2018 period suggest that growth in the emerging industries has continued with an estimated increase in turnover, GVA and employment, of 19% to €458 million, 12% to €177 million and 7% to 2,084 FTEs, respectively.

In 2018
Ireland's ocean
economy had
an estimated
turnover of

€6.2
bn



Table 5: Direct Turnover by sector (Euro Million), 2010-2018

	Direct Turnover (€ millions)									% Change	
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2014-2016	2016-2018
Established Markets											
Shipping and Maritime Transport	1,684.81	1,722.46	2,247.40	1,636.86	1,945.46	1,887.46	2,095.58	2,200.36	2,288.37	8%	9%
Marine Tourism and Leisure	1,003.38	864.47	775.75	890.83	984.58	852.95	1,077.98	1,150.21	1,253.73	9%	16%
International Cruise Industry	21.66	21.44	20.83	25.72	24.30	27.00	25.94	36.63	51.44	7%	98%
Marine Retail Services	57.69	...	119.23	109.50	152.63	136.35	159.02	149.20	167.03	4%	5%
Sea Fisheries	187.80	235.30	268.90	276.40	311.90	244.17	303.67	309.00	315.39	-3%	4%
Marine Aquaculture	122.50	128.50	130.30	117.72	116.30	148.66	167.17	208.00	176.00	44%	5%
Seafood Processing	470.22	530.69	535.49	576.84	517.05	563.14	602.29	626.38	563.74	16.5%	-6.5%
Oil and Gas Exploration and Production	212.59	205.11	229.88	215.73	199.64	139.25	597.28	632.76	819.00	199%	37%
Marine Manufacturing, Construction and Engineering	110.81	...	199.08	164.91	121.00	120.35	107.61	121.61	136.78	-11%	27%
Established Markets Sub-Total	3,871.46	3,707.97	4,526.86	4,014.51	4,372.86	4,119.34	5,136.52	5,434.14	5,771.47	17%	12%
Emerging Markets											
Advanced Marine Technology Products and Services	55.92		71.28	74.03	80.07	90.94	139.68	98.29	96.45	74.5%	-31%
Marine Commerce	53.60		86.56	108.18	138.45	134.55	140.73	179.19	228.15	1.65%	62%
Marine Biotechnology and Bio-products	29.87		44.51	46.40	29.51	39.61	43.61	67.07	76.41	48%	75%
Marine Renewable Energy	11.54		15.83	18.75	26.89	29.03	59.00	58.29	57.59	119%	-2%
Emerging Markets Sub-Total	150.93		218.17	247.35	274.92	294.13	383.02	402.83	458.60	39%	20%
Total	4,022.39	3,707.97	4,745.03	4,261.85	4,647.77	4,413.47	5,519.55	5,836.97	6,230.07	18%	13%

Table 6: Direct GVA by sector (Euro Millions), 2010-2018

	Direct GVA (€ millions)									% Change	
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2014-2016	2016-2018
Established Markets											
Shipping and Maritime Transport	416.25	433.97	374.59	467.31	488.50	577.56	638.47	670.39	697.21	31%	9%
Marine Tourism and Leisure	289.52	316.06	329.92	357.49	396.53	433.30	557.54	594.89	648.44	40%	16%
International Cruise Industry	6.25	7.84	8.86	10.32	9.79	10.14	9.76	14.33	20.34	-0.2%	108%
Marine Retail Services	33.91	...	34.56	33.37	60.05	68.52	70.96	66.58	74.53	18%	5%
Sea Fisheries	65.00	105.10	142.60	134.70	168.10	114.00	164.50	166.00	173.00	-2%	5%
Marine Aquaculture	46.20	53.30	60.60	31.19	49.16	81.85	98.40	118.56	100.32	100%	2%
Seafood Processing	121.36	140.23	126.71	127.86	135.21	131.41	172.15	179.03	161.13	27%	-6.5%
Oil and Gas Exploration and Production	25.80	24.89	27.89	26.18	23.96	22.33	71.67	82.26	106.47	199%	48.5%
Marine Manufacturing, Construction and Engineering	44.00	...	32.83	46.72	64.96	65.43	60.98	63.11	67.89	-6%	11%
Established Markets Sub-Total	1,048.28	1,081.39	1,138.57	1,235.12	1,396.26	1,504.52	1,844.43	1,955.14	2,049.33	32%	11%
Emerging Markets											
Advanced Marine Technology Products and Services	20.81		38.61	43.55	36.11	38.11	60.63	42.66	41.87	68%	-31%
Marine Commerce	31.81		49.17	49.91	42.17	41.63	41.76	53.17	67.70	-1%	61%
Marine Biotechnology and Bio-products	12.99		18.76	19.67	4.62	13.91	16.99	26.13	29.77	267%	75%
Marine Renewable Energy	3.65		8.65	11.95	15.40	18.68	38.10	37.64	37.19	147%	-2%
Emerging Markets Sub-Total	69.26		115.18	125.07	98.30	112.33	157.48	159.61	176.52	60%	12%
Total	1,117.53	1,081.39	1,253.75	1,360.19	1,494.56	1,616.86	2,001.92	2,114.76	2,225.85	33%	11%

Table 7: Direct Employment by sector, 2010-2018

	Direct Employment (FTEs)									% Change	
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2014-2016	2016-2018
Established Markets											
Shipping and Maritime Transport	4,092	3,684	3,933	4,336	4,375	4,553	4,629	4,860	5,055	6%	9%
Marine Tourism and Leisure	12,562	12,753	13,003	13,439	13,865	13,946	15,905	16,970	18,107	15%	14%
International Cruise Industry	...	...	...	...	...	...	...	...	...	...	...
Marine Retail Services	252	...	590	613	743	755	810	831	927	9%	14.5%
Sea Fisheries	3,479	2,688	2,709	2,717	2,395	2,522	2,536	2,660	2,663	6%	5%
Marine Aquaculture	952	958	956	956	941	988	1,030	1,912	1,925	9.5%	87%
Seafood Processing	1,975	2,013	2,174	2,226	2,360	2,284	2,429	2,526	2,383	3%	-2%
Oil and Gas Exploration and Production	57	64	84	83	85	90	145	149	154	70.5%	6%
Marine Manufacturing, Construction and Engineering	726	...	875	953	906	860	779	806	834	-14%	7%
Established Markets Sub-Total	24,094	22,160	24,324	25,323	25,670	25,998	28,263	30,715	32,048	10%	13%
Emerging Markets											
Advanced Marine Technology Products and Services	391		420	437	561	574	695	608	683	24%	-2%
Marine Commerce	110		161	165	322	339	342	365	389	6%	13.5%
Marine Biotechnology and Bio-products	304		373	406	436	482	453	345	545	4%	20%
Marine Renewable Energy	216		245	276	401	432	454	461	467	13%	3%
Emerging Markets Sub-Total	1,021		1,199	1,284	1,720	1,827	1,945	1,779	2,084	13%	7%
Total	25,115	22,160	25,523	26,607	27,391	27,825	30,208	32,494	34,132	10%	13%

Figures 2 and 3 show the general trend in direct turnover, GVA and employment for established and emerging marine industries in the 2008-2018 period, respectively. Overall the established industries experienced a fall in activity between 2009 and 2012, a reflection of the economic downturn during the great recession. Between 2013 and 2018, there has been a steady increase in economic activity, as measured by GVA, which in some industries has been significant. The general trend in direct turnover, GVA and employment in emerging marine industries for the period 2010-2018 is also upwards, particularly with regards to turnover and employment. Individual industry details on these trends are shown in the following sections of the report.

Figure 2: Direct Turnover, GVA and Employment; Established Marine Industries, 2008-2018

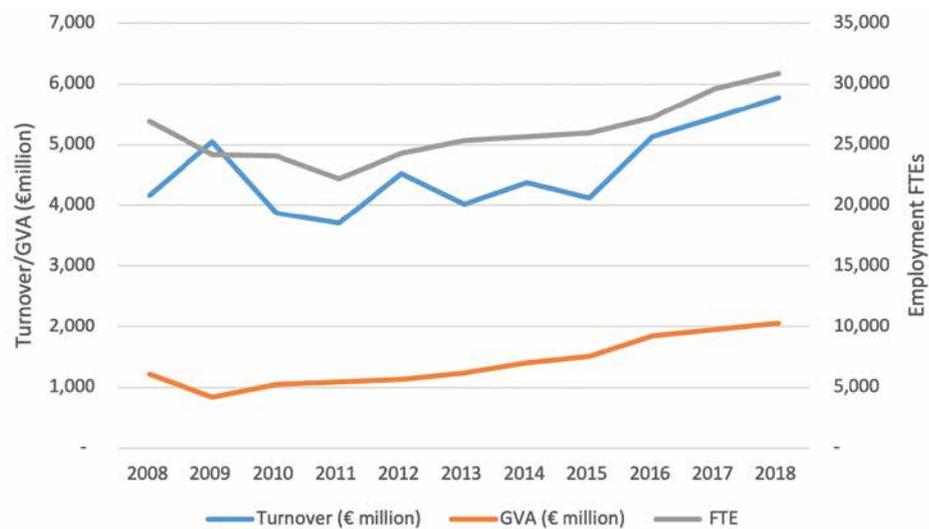
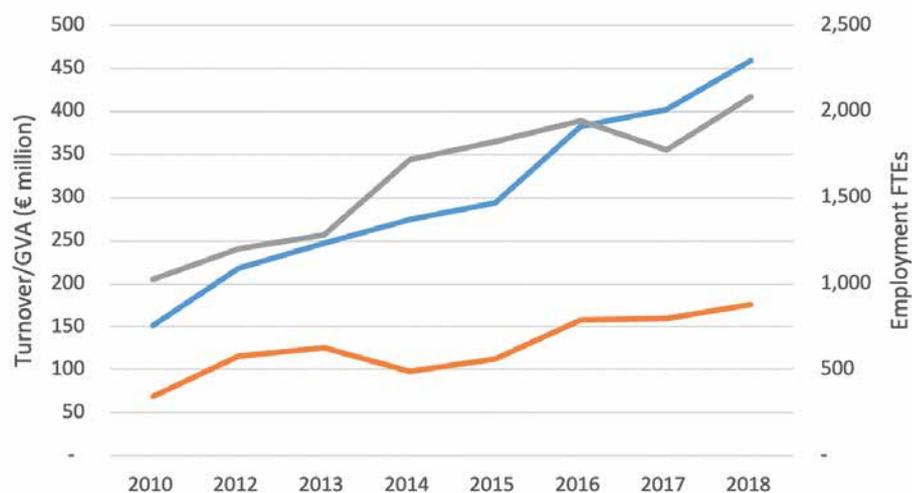


Figure 3: Direct Turnover, GVA and Employment; Emerging Marine Industries, 2010, 2012-2018

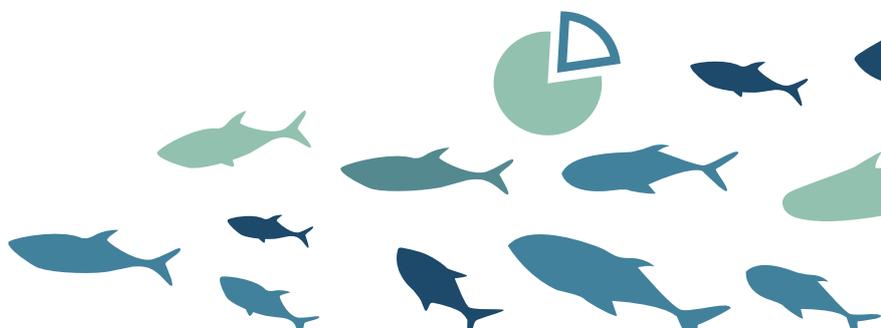
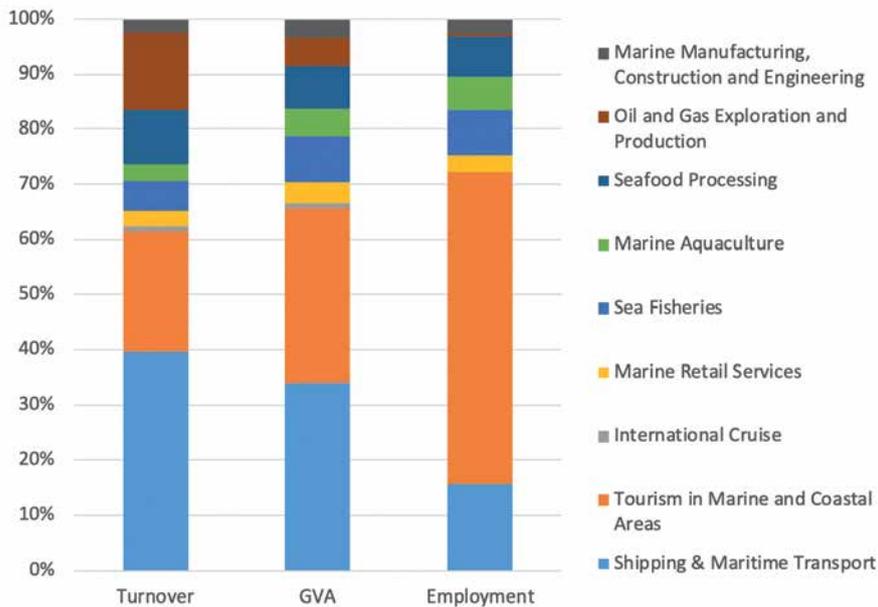


Established Marine Industries

Established marine industries refer to the traditional sectors that are usually associated with marine activity. Established marine industries had a turnover of €5.14 billion in 2016 and provided employment of 28,263 FTEs, representing 94% of the turnover and employment in Ireland's ocean economy.

In 2018 the established marine Industries had an estimated turnover of €5.77 billion and provided estimated employment to 32,048 FTEs. The established industries include shipping and maritime transport, tourism and leisure in marine and coastal areas, international cruise, sea fisheries, marine aquaculture, seafood processing, oil and gas exploration and production, marine manufacturing, construction and engineering and marine retail services. The relative contribution of each of these sectors to the overall turnover, employment and GVA of the established marine industries are shown in Figure 4 for 2016.

Figure 4: Relative contribution (%) of each subsector within the Established Irish Marine Industries to turnover, GVA and employment, 2016



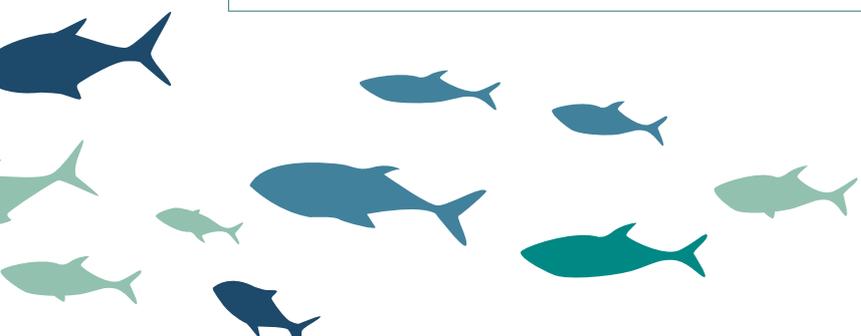
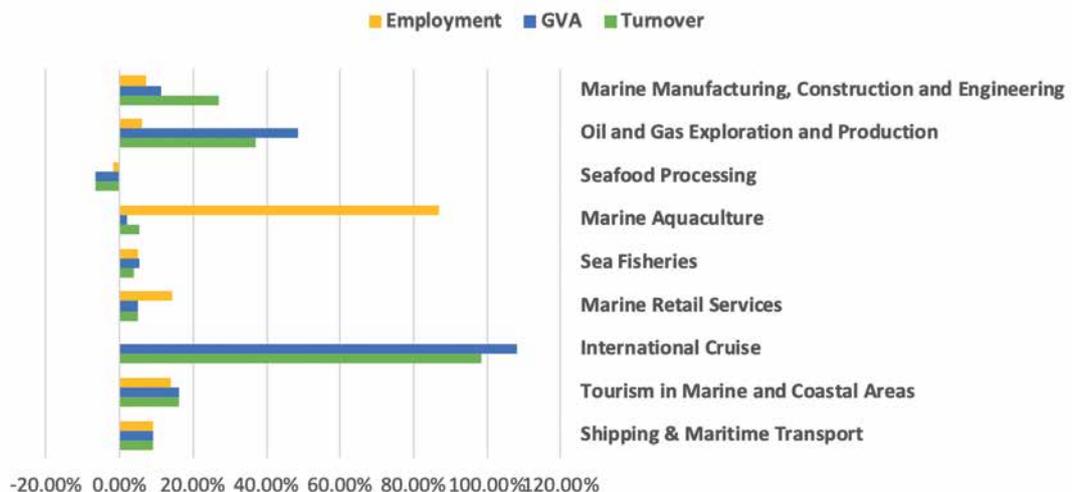
The shipping and maritime transport sector was the largest contributor to established marine industries in terms of turnover, followed by tourism and leisure in marine and coastal areas, seafood processing, sea fisheries and oil and gas exploration and production, respectively.

Tourism and leisure in marine and coastal areas was the largest contributor to employment across the established marine industries, followed by shipping and maritime transport, seafood processing and sea fisheries, respectively. Indeed tourism and leisure in marine and coastal areas accounts for 57% of all employment in the Irish ocean economy. This share is even higher in other European member state's ocean economies.

In terms of GVA, again shipping and maritime transport is the largest contributor to Ireland's established marine industries, followed by tourism and leisure in marine and coastal areas, sea fisheries and seafood processing, respectively.

Figure 5 shows the rate of change in turnover, GVA and employment for the established industries in the 2016-2018 period. International cruise has experienced the largest increase in turnover and GVA. Oil and gas exploration and production also show significant increases in value over this period while, according to BIM statistics, aquaculture experienced a large increase in employment. The majority of this expansion in employment occurred in 2017 while there was actually only a 0.5% increase in numbers employed in the industry, year on year, in 2018. In contrast, seafood processing shows a slight decline in turnover and GVA. Details on economic trends by sector are presented in the following sections, as well as the economic projections out to 2018.

Figure 5: Rates of change (%) in turnover, GVA and employment. Established Industries, 2016-2018





€2.1 bn

Economic contribution of the shipping and maritime transport services and operations in 2016

Shipping and Maritime Transport

Shipping and maritime transport provides supply chain integration and international trade connectivity for Ireland to the main global trade routes and markets. Marine trade is the most cost efficient and sustainable way of trade, especially for cargoes with relatively high volume and long origin-destination distances. The maritime transport industry represented approximately 85% of the total volume, and 56% of the total value⁷ of the cargoes transported for export and import in Ireland in 2016⁸.

The shipping and maritime transport sector consists of waterborne transport activities including both freight and passenger transport, as well as many related services, including ship chartering and brokering, equipment leasing, stevedoring etc. Table 8 illustrates the turnover, GVA, and employment rates for the industry for 2014, 2016 and 2018, as well as the % change between 2014 and 2016 and 2016 and 2018. Figure 6 indicates the numbers for both the turnover and employment rates between 2008 and 2018.

PROFILE

- Sea and coastal passenger water transport
- Sea and coastal freight water transport
- Services incidental to water transport
- Cargo handling
- Renting and leasing of water transport equipment
- Other transportation support activities

Note marine commerce and cruise tourism are covered elsewhere in the report.

Table 8: Shipping and Maritime Transport turnover, GVA, employment, 2014, 2016 and 2018(e)

Shipping and Maritime Transport	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	1,945,455	2,095,577	2,288,370	8%	9%
GVA €000's	488,502	638,471	697,210	31%	9%
Employment FTEs	4,375	4,629	5,055	6%	9%
Location of activity	The majority of shipping and maritime operations and services occur around commercial ports along the coast of Ireland: Cork, Drogheda, Dublin, Waterford, Dundalk, Dun Laoghaire, Galway, New Ross, Shannon Foynes and Wicklow				

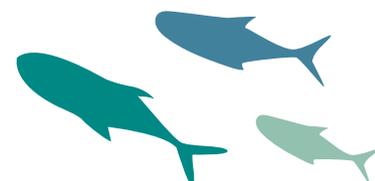
Source: CSO – Annual Services Inquiry (ASI), NACE Four-Digit Codes: 50.10, 50.20, 52.22, 52.24, 52.29, 77.34; IMDO iShip Index; CSO Quarterly National Household Survey; Figures for 2017 and 2018 are estimates⁹

The economic contribution of the shipping and maritime transport services and operations to the Irish economy reached €2.1 billion in 2016. In total €638 million was generated in GVA. Turnover of the industry increased from 2014 to 2016 by 8%, with 31% growth in GVA observed in the same period.

⁷ 44 million tonnes and €68 billion

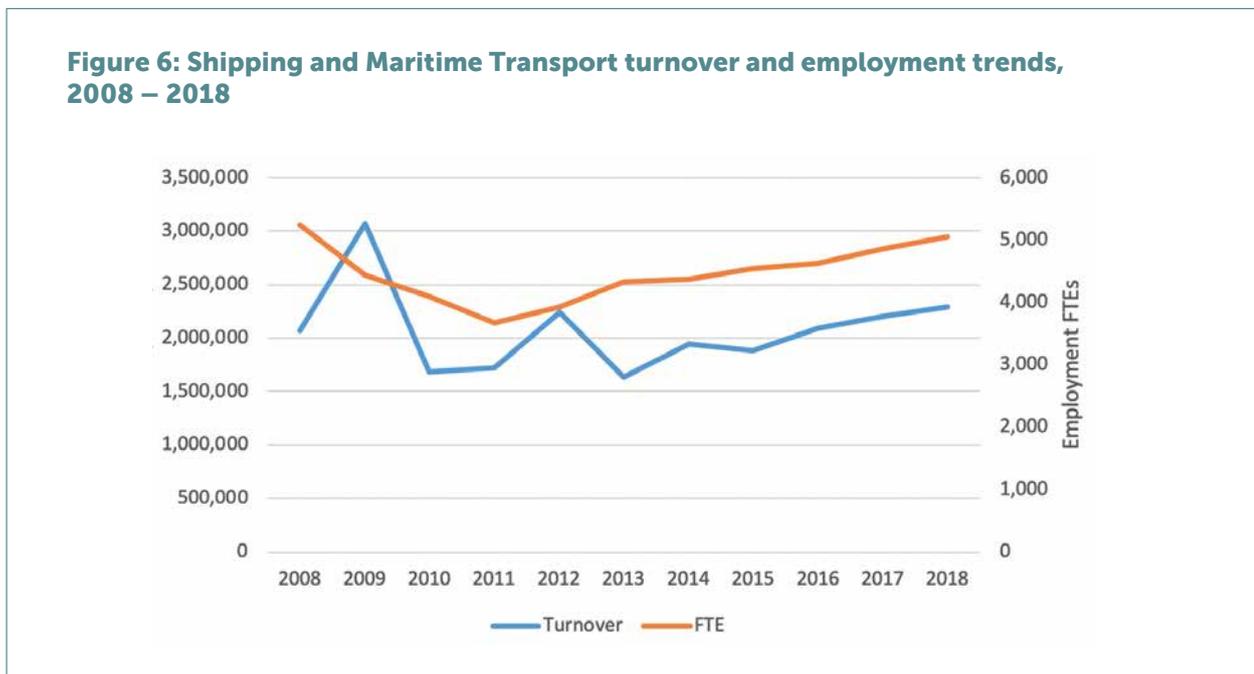
⁸ CSO Trade Statistics – INTRASTAT, 2017

⁹ See Appendix 1 for details on the methodology.



Approximately €2.3 billion was generated in turnover by the industry in 2018. It is estimated that 5,055 FTEs were employed in the industry in 2018, which indicates a 4% annual increase in employment. In 2018, GVA was estimated to have been €697.2 million.

Even though turnover is still estimated here to be below the highest level recorded in 2009, the industry has been in a relatively slow but steady recovery period. This is closely associated with global supply-demand imbalance in the global shipping and maritime transport industry and a deceleration of international trade growth in recent years. Recent figures from the IMDO suggest however that total port volumes reached record levels in 2018, exceeding those set in 2008¹⁰. Figure 6 illustrates the recorded and estimated data trends for both the turnover and employment rates between 2008 and 2018.



Source: CSO – Annual Services Inquiry (ASI), NACE Four-Digit Codes: 50.10, 50.20, 52.22, 52.24, 52.29, 77.34; IMDO iShip Index; CSO Quarterly National Household Survey; Figures for 2017 and 2018 are estimates¹¹

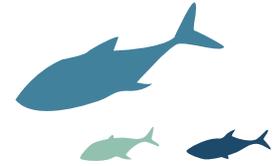
Based on data provided by the IMDO a 3% increase in dry bulk port traffic, a 2% increase in liquid bulk port traffic and a 4% increase in lo-lo/container traffic was recorded in 2018, in comparison to 2017 data. While these figures indicate clear evidence of growing international trade activity in Ireland, uncertainties around Brexit remain a concern and are creating continuing operational unknowns in the shipping and maritime transport industry. Both freight and passenger transport are likely to be affected. Another recent IMDO study¹² concluded that the Irish economy is also significantly reliant on the landbridge route, the commonly used freight transportation route between Ireland and continental Europe via Britain. It found that 38% of Irish unitised exports (RoRo and LoLo traffic) to EU continental ports ship via the landbridge and that certain sectors such as agri-food, seafood, and other sectors trading in time sensitive produce could be adversely affected by any deterioration in transit times or increases in costs that may result once the UK leaves the EU.

¹⁰ Irish Maritime Development Office (2019), Maritime Transport Economist 15th Edition, The Irish Maritime Development Office, IMDO Publication

¹¹ See Appendix for details on the methodology.

¹² Breen, B., Brewster, P., O’ Driscoll, C., Tsakiridis, A., (2018). The Implications of Brexit on the Use of the Landbridge, Dublin: Irish Maritime Development Office.

Tourism and Leisure in Marine and Coastal Areas



One of the key industries contributing to Ireland's ocean and coastal economies is tourism and leisure. Tourism and leisure in marine and coastal areas¹³ continues to provide the highest employment numbers in Ireland's ocean economy. Excluding coastal accommodation, an estimated 260 enterprises are also involved in the delivery of marine leisure activities around the coast of Ireland.

The overall tourism industry contributed an estimated €8.4 billion in 2017 to the Irish economy and overseas tourist visits to Ireland in 2018 grew by 6% (9.5 million visitors) relative to 2017¹⁴. Tourism and leisure in coastal areas is a significant component of this overall market.

Marine-based tourism and leisure activity demand consists of both a domestic and an international market. Fáilte Ireland figures indicate that approximately 135,000 tourists participated in angling in 2017. Marine activities such as surfing, windsurfing, kite surfing, sailing and sea kayaking are also very popular among domestic tourists. Tourist attractions in coastal areas, for instance the Cliffs of Moher and Dun Aengus on the Aran Islands, continue to be popular destinations for international tourists. The Cliffs of Moher visitor centre was recorded as the second most visited tourism destination in Ireland in 2018, hosting 1.58 million tourists, with a 3.8% growth in comparison to 2017.

Figure 7 shows the most popular coastal county destinations by marine activity for a sample of 600 overseas visitors as recorded in a recent SEMRU overseas tourism survey¹⁵. The west coast dominates in terms of marine-related activity demand amongst our overseas visitors. This may reflect in part the success of the Fáilte Ireland Wild Atlantic Way initiative.

The turnover, GVA, and employment for 2014, 2016 and 2018, as well as the % change between 2014 and 2016 and between 2016 and 2018, are illustrated in Table 9. Figure 8 presents the trends for both turnover and employment rates between 2010 and 2018.

PROFILE

Watersports

- Sailing at sea
- Boating at sea
- Water skiing/Jet skiing
- Surfing, sail boarding
- Sea kayaking
- Scuba diving/snorkeling
- Other sea sports

Seaside/Resort Trips

- Swimming in the sea
- Bird watching in coastal areas
- Whale/dolphin watching
- Visiting coastal natural reserves
- Other trips to the beach seaside and islands
- Coastal accommodation

Angling

- Sea angling from boats
- Sea angling from the shore

¹³ For the purpose of this study, tourism is defined as tourism in coastal areas. Coastal areas are defined as municipalities (LAU-2) that either border on the sea or have 50% of their surface within a distance of 10 km from the sea).

¹⁴ Fáilte Ireland Tourism Facts, 2017 and Preliminary 2018

¹⁵ A full report on the overseas tourism survey is currently will be published in 2019.

Figure 7: Overseas tourist marine and coastal activity by coastal county, 2018. Results of SEMRU visitor survey

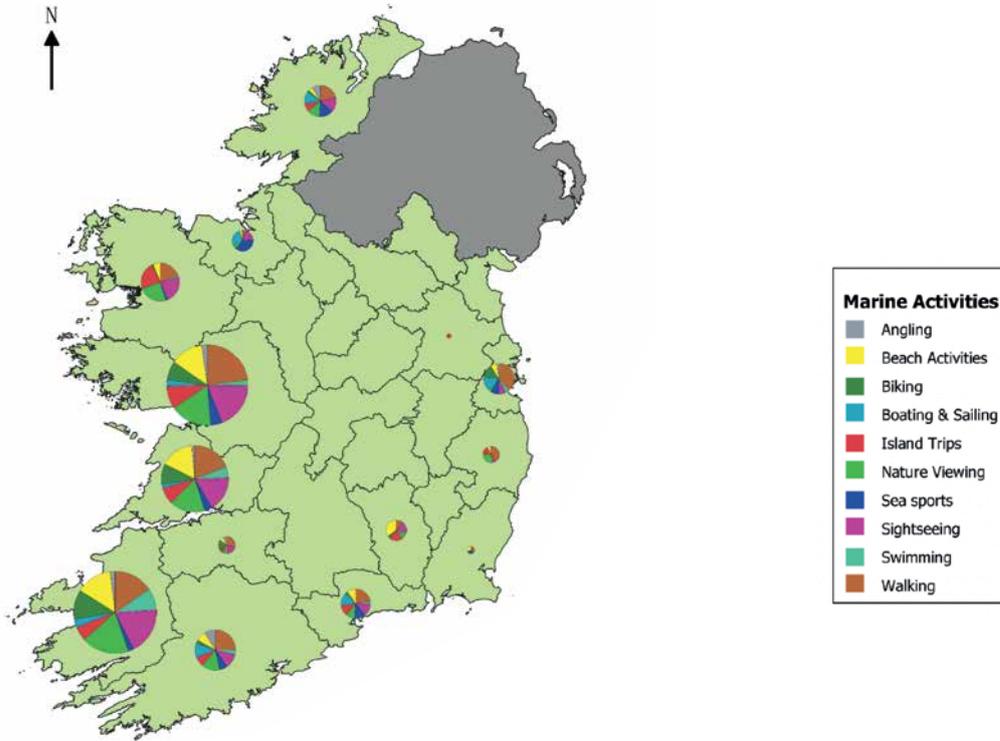


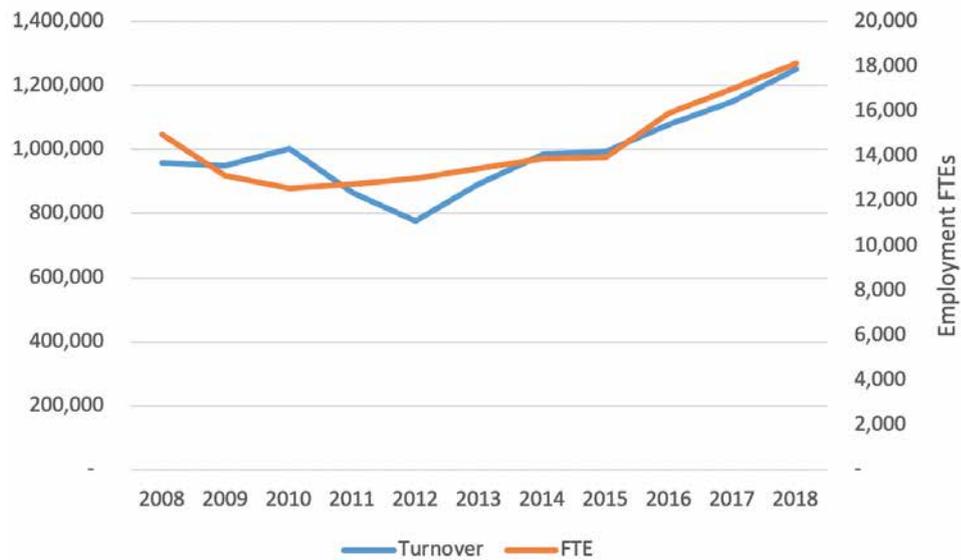
Table 9: Tourism and Leisure in Marine and Coastal Areas; turnover, GVA, employment, 2014, 2016 and 2018

Tourism	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €'000	984,580	1,077,985	1,253,729	9%	16%
GVA €000's	396,528	557,543	648,440	40%	16%
Employment FTEs	13,865	15,905	18,107	15%	14%
Location of activity	Tourism and leisure in marine and coastal areas are offered all along the coast of Ireland				

Source: CSO – Annual Service Inquiry (ASI); NACE Four-Digit Code: 5510, 5520, 5530, 9312, 9319, 9321, 9329; Fáilte Ireland statistics.

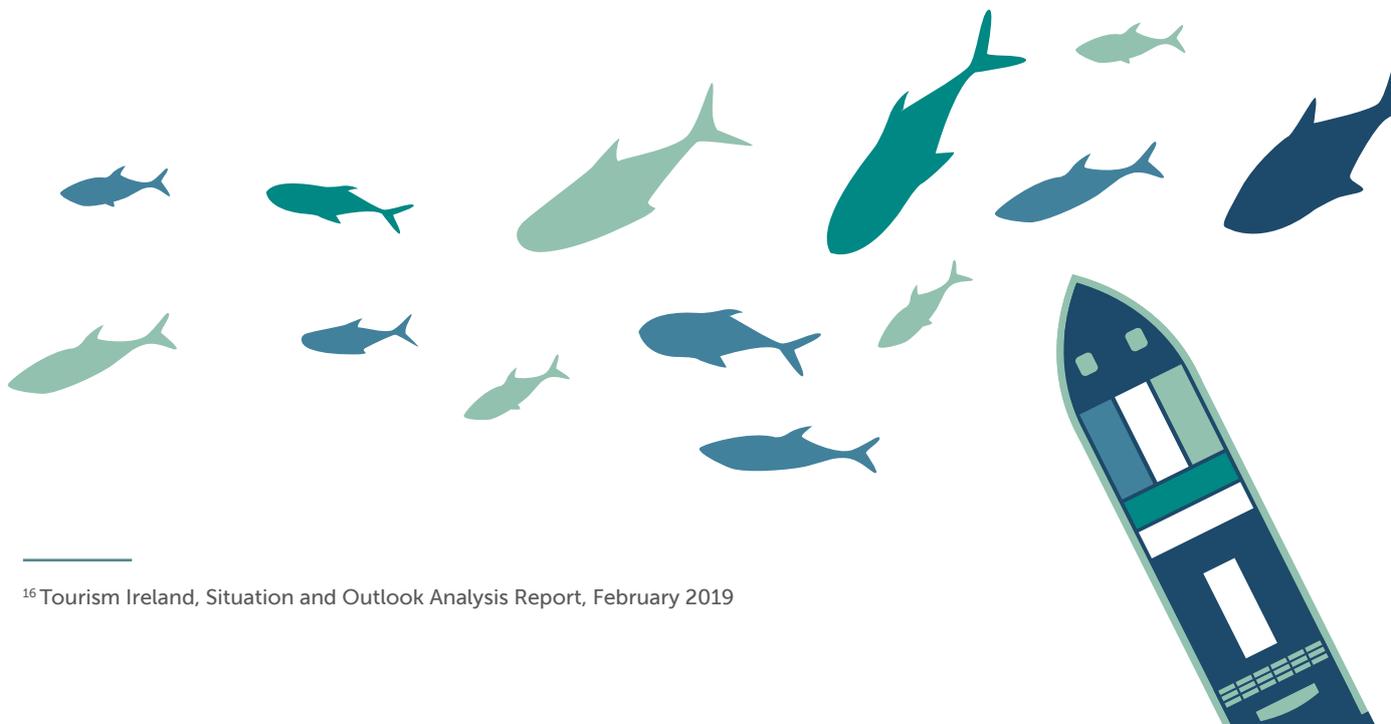
Following the drop in tourism activity during the great recession, the industry has been on a reasonably steady growth path since 2012. The turnover generated by the sector in 2016 was €1,078 million. GVA was €558 million in 2016 representing an increase in activity of 40% between 2014 and 2016. In the same period, employment also increased to 15,905 FTEs, an increase of 15%. Estimated figures for 2017 and 2018 suggest that turnover, GVA and employment have all increased in line with Fáilte Ireland’s observed growth in tourism numbers for this period. Turnover from the sector is estimated to have reached €1.25 billion in 2018.

Figure 8: Tourism and Leisure in Marine and Coastal Areas; turnover and employment trends, 2008 – 2018



Source: CSO – Census of Industrial Production (CIP) NACE Four-Digit Code: 5510, 5520, 5530, 9312, 9319, 9321, 9329. Fáilte Ireland statistics.

Tourism Ireland has presented an optimistic view for tourism in Ireland for the 2019 season and the expectations are, that if Ireland can remain competitive, visitor numbers will continue to grow¹⁶. Brexit continues to create uncertainties in terms of demand from our largest overseas market, Britain. A recent SEMRU overseas coastal and marine tourism survey showed that 17% of British tourists believed that Brexit would be a barrier to making future visits to Ireland with a further 30% unsure if it would impact on their future travel plans to Ireland or not. Despite the Brexit uncertainties, Fáilte Ireland figures indicate that the number of British tourists that visited Ireland in 2018 increased marginally by 0.8% on the previous year.



¹⁶Tourism Ireland, Situation and Outlook Analysis Report, February 2019

In 2017 the overall tourism industry contributed to the Irish economy an estimated

€8.4 bn 



International Cruise Industry

Visiting Ireland via cruise ships is becoming increasingly popular amongst tourists. According to the Cruise Lines International Association (CLIA) there was a 6.7% increase in cruise passenger numbers globally from 2017 to 2018 with a total of 28.5 million passengers traveling on board cruise ships in 2018¹⁷. Approximately 14.2 million of those were from North America, representing 49.9 percent of global ocean passengers. In addition, 25.1 percent of total passengers came from Europe, followed by Asia-Pacific and South America.

Global growth of the industry has increased the demand for new cruise line itineraries and Ireland continued to capitalise on this with some of its most popular tourist attractions in close proximity to the cruise ships main ports of call.

Table 10 indicates the total expenditure by disembarking cruise passengers at Irish ports and GVA for 2014, 2016 and 2018, as well as the percentage change in the 2014-2016 and 2016-2018 periods. Figure 9 illustrates the number of passenger and cruise ship visits to Irish ports from 2010 to 2018.

PROFILE

The main ports of call for cruise liners include:

- Dublin
- Cork
- Waterford
- Galway
- Dun Laoghaire



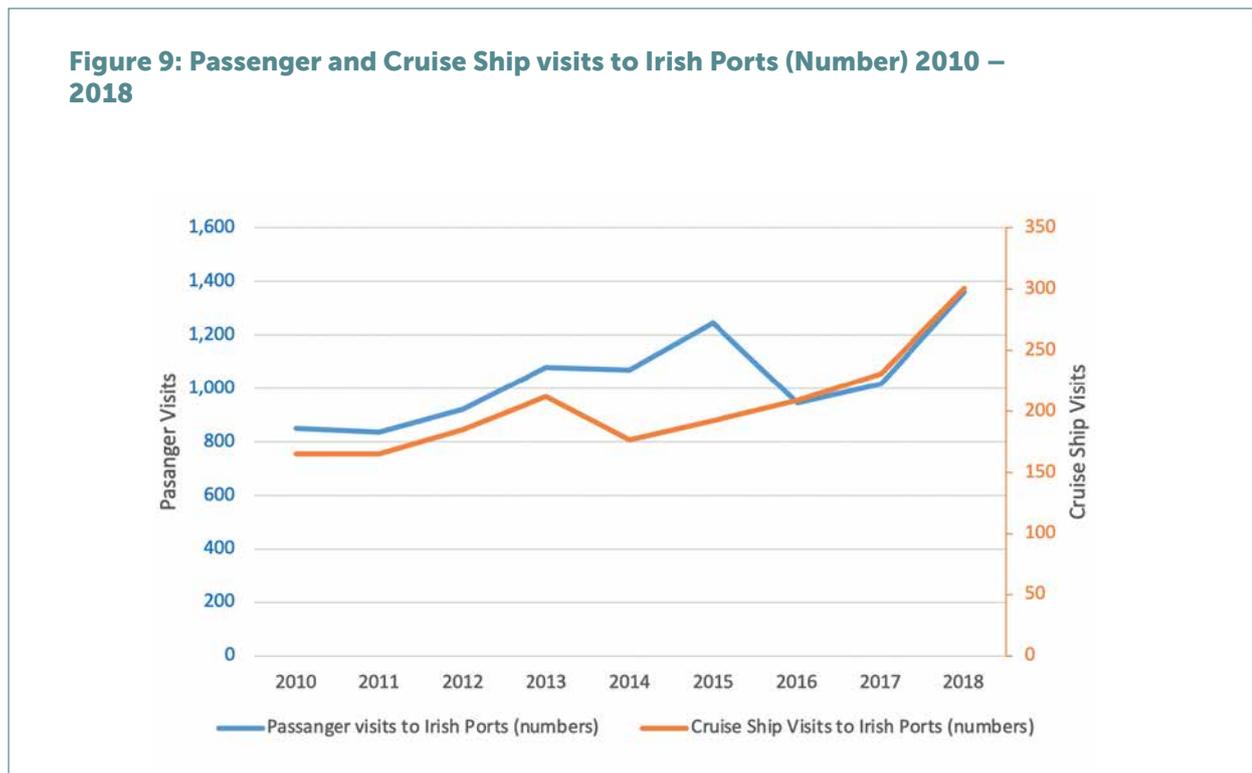
Table 10: International Cruise passengers, calls, expenditure, GVA, 2014, 2016 and 2018

International Cruise Industry	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Average passengers per port call	1,068	947	1,362	-11%	43%
Number of calls Irish ports	177	209	301	18%	44%
Total expenditure by disembarking cruise passengers €000's	24,296	25,937	51,440	7%	98%
Estimated Gross Value Added €000's	9,785	9,765	20,339	-0.2%	108%

Source: IMDO - The Irish Maritime Transport Economist

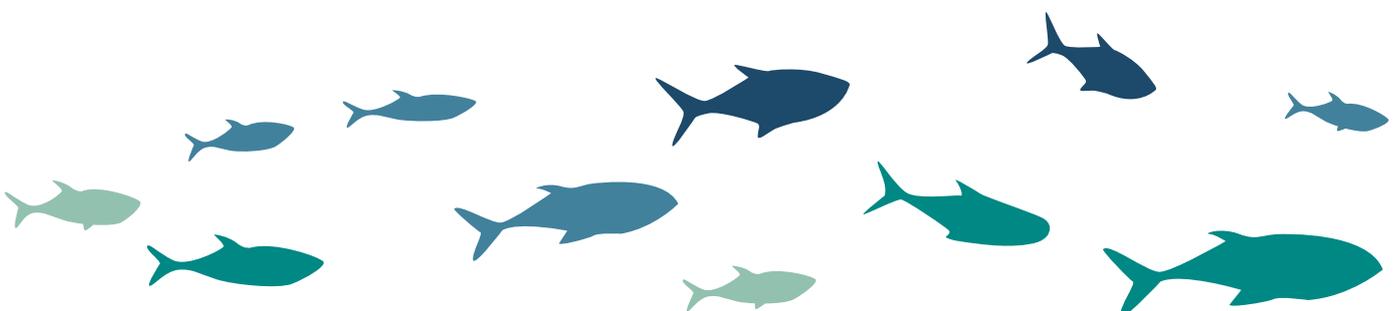
¹⁷ CLIA, "The Cruise Industry: Contribution of Cruise Tourism to the Economies of Europe", 2019. 2018 Cruise Trends & Industry Outlook, available at: [https://cruising.org/-/media/research-updates/research/clia-2019-state-of-the-industry-presentation-\(1\).pdf](https://cruising.org/-/media/research-updates/research/clia-2019-state-of-the-industry-presentation-(1).pdf)

In 2018, 301 cruise ships berthed at Irish ports, indicating a 44% increase from 2016 figures. The total expenditure by disembarking cruise passengers is estimated at €51.4 million in 2018, indicating a 95% increase, in comparison to 2016. According to estimates, the GVA from cruise tourism expenditure generated by the sector in 2018 was €20.3 million, which represents a doubling of the contribution of the industry to the Irish economy since 2016.



Source: IMDO

The international cruise industry remains one of the fastest growing travel markets in the world and strong growth is continuing to be projected for the global cruise industry in the coming years. However Dublin port has recently announced plans to reduce the number of berths available to cruise ships from 160 in 2019 to 80 in 2021. The port has indicated that this is necessary in order to generate increased berthing capacity for container traffic post Brexit. This decision could have major implications for cruise liner tourism not just in Dublin but across all of Ireland. For some cruise ship operators Dublin is the key destination on their Irish itinerary. The possible unavailability of Dublin port as a destination could mean that booking agencies will move cruise trips from here to other EU destinations. The Dublin port decision could have a significantly negative impact for cruise tourism growth in the coming years.



Marine Retail Services

Marine Retail Services consist of various small and medium sized enterprises dealing with different marine retail services, including the sale of marine equipment, boat sales, chandlery, and the retail of seafood in fishmonger shops. Table 11 illustrates the turnover, GVA, and employment for 2014, 2016 and 2018 (estimated) as well as the % change for each period. Figure 10 also indicates the trends for both turnover and employment over the 2010-2018 period.

PROFILE

- Chandlery
- Boat sales
- Marine equipment sales
- Retail of seafood in fishmonger specialised stores

Table 11: Marine Retail Services turnover, GVA, employment, 2014, 2016 and 2018

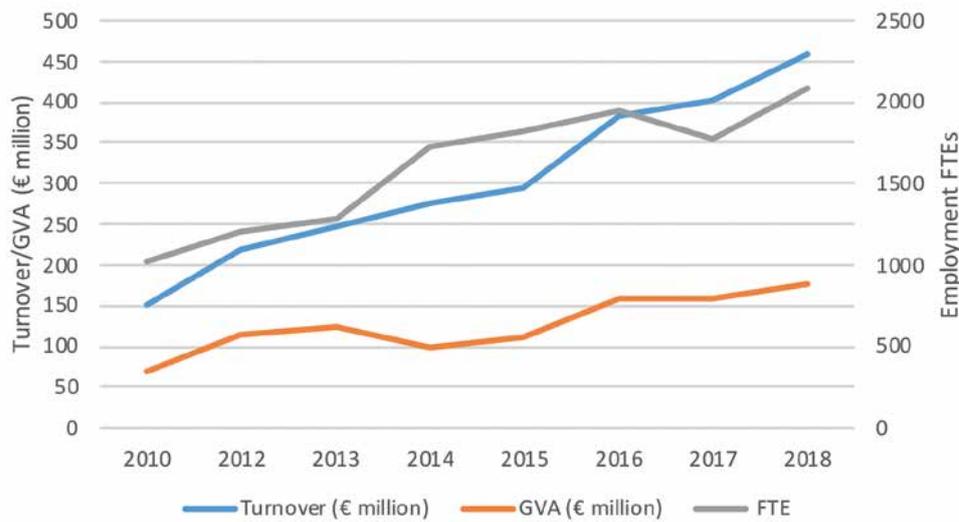
Marine Retail Services	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	152,626	159,019	167,029	4%	5%
GVA €000's	60,050	70,960	74,534	18%	5%
Employment FTEs	743	810	927	9%	14.5%
Location of activity	Marine Retail Services are located throughout Ireland, both along the coast and inland, (the boat sales and seafood retail categories particularly relates to the latter). The majority of the technology-related marine service companies are located within the larger cities, primarily Galway, Cork and Dublin				

Source: SEMRU Company Survey, CSO – Annual Services Inquiry (ASI) NACE Four-Digit Code 47.23; CSO – Retail Services Inquiry; CSO – National Household Survey; Figures for turnover and GVA for 2018 are estimates.

The turnover generated by marine retail services in 2016 was €159 million. Total GVA generated was €71 million. Turnover increased between 2014 and 2016 by 4%, with an 18% increase in GVA in the same period. Employment in marine retail services was 810 FTEs in 2016, which shows an increase of 9% with respect to 2014. Estimates suggest that the turnover generated by the sector in 2018 was €167 million, representing again an increase in activity of 5% between 2016 and 2018. Estimated GVA and employment increased again by approximately 5% to €74 million and 7927 FTEs respectively in the same period.

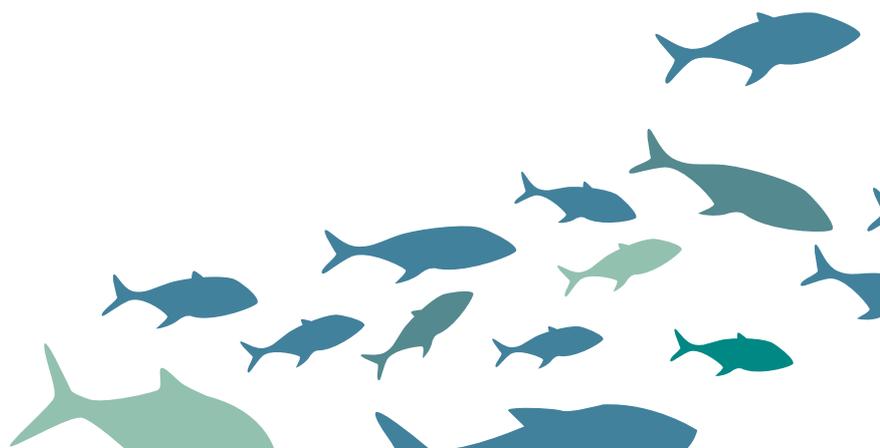
Figure 10 shows the trends in turnover and employment over the 2010-2018 period. Turnover and employment have seen steady growth since 2010.

Figure 10: Marine Retail Services turnover and employment trends, 2010 and 2012-2018



Source: SEMRU Company Survey, CSO – Annual Services Inquiry (ASI) NACE Four-Digit Code 47.23; CSO – Retail Services Inquiry; CSO – National Household Survey; Figures for turnover and GVA for 2017 and 2018 are estimates.

The marine retail sector is subject to similar challenges and opportunities as the overall retail sector in Ireland. According to Trading Economics, Ireland's retail sales increased by 3.7% year on year, in 2018. This trend is expected to continue at a projected growth rate of around 2.5% until 2020. The industry however remains vulnerable to movements in the sterling exchange rate on the back of Brexit uncertainty, particularly in the area of boat sales and marine equipment sales.





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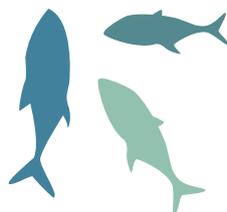
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Sea Fisheries



Sea fisheries represent an important component of the ocean economy in Ireland in terms of revenue and employment. According to the latest EU economic report on the EU fishing fleet (STECF 18-07), the Irish fishing fleet was comprised of 1953 registered vessels, with a total capacity of 60.5 thousand Gross Tonnes (GT) in 2017. Table 12 shows turnover, GVA, and employment levels for 2014, 2016 and 2018, as well as the percentage changes between 2014 and 2016 and between 2016 and 2018.

Figure 11 presents the trends for turnover and employment in the sea fisheries sector over the period 2008-2018. Turnover in 2018 exceeded €315 million, whilst GVA was estimated at €173 million. Turnover generated by the sector in 2016 was €304 million, representing a decrease in activity of 3% between 2014 and 2016. GVA also decreased by 2%, however employment increased by 6%. The economic performance of sea fisheries improved in the following two years, with turnover, GVA and employment increasing by 4%, 5% and 5% respectively, from 2016 to 2018.

PROFILE		
Fishing Segments	Main Target Species	
<ul style="list-style-type: none"> • Pelagic • Polyvalent • Beam-trawl • Specific 	<p><i>Fin Fish</i></p> <ul style="list-style-type: none"> • Mackerel • Herring • Horse Mackerel • Blue Whiting • Monkfish • Megrim • Haddock • Whiting 	<ul style="list-style-type: none"> • Cod • Sole • Plaice <p><i>Shellfish</i></p> <ul style="list-style-type: none"> • Lobster • Dublin Bay prawns • Mussels • Scallops • Razor Clams

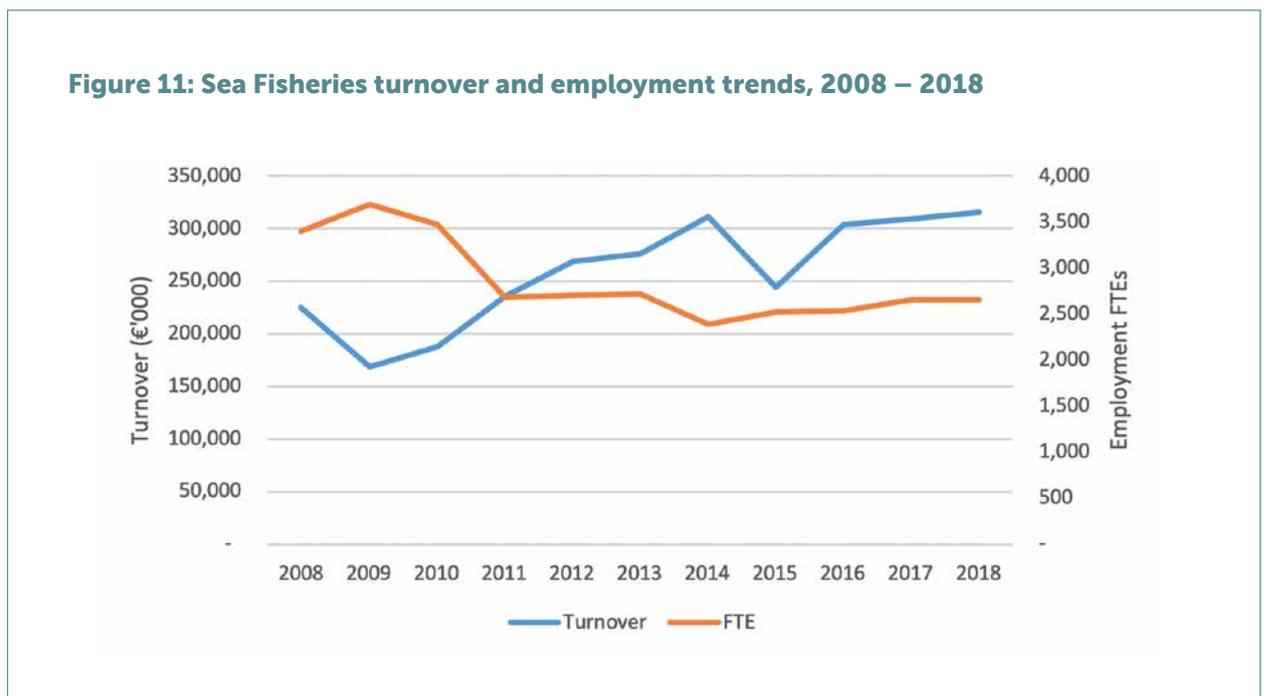
Table 12: Sea Fisheries turnover, GVA, employment, 2014, 2016 and 2018

Sea Fisheries	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	311,900	303,670	315,390	-3%	4%
GVA €000's	168,100	164,500	173,000	-2%	5%
Employment FTEs	2,395	2,536	2,663	6%	5%
Location of activity	Fishing communities are distributed around the coast of Ireland, centred particularly on the fishing harbours of Killybegs (Co. Donegal), Ros an Mhil (Co. Galway), An Daingean (Co. Kerry), Castletownbere (Co. Cork), Dunmore East (Co. Waterford) and Howth (Co. Dublin).				

Source: Bord Iascaigh Mhara (BIM); Scientific, Technical and Economic Committee for Fisheries (STECF) – The Annual Economic Report on the EU Fishing Fleet, 2018

Growth in the sea fisheries sector and the wider seafood economy between 2016 and 2018 was partially influenced by an increase in the price for key species such as nephrops, substantial government investment in fishing ports and harbours with support directed through the European Maritime and Fisheries Fund (EMFF) and private investment driven by changes in lending practices by financial institutions and growing optimism in the catching sector.¹⁸

Brexit continues to cause concern in the industry. While transitional arrangements for fisheries have been provisionally agreed between the UK and the EU in the draft withdrawal agreement, until the negotiations actually conclude concerns remain surrounding access to fish in the UK zone, potential loss of quota share and the potential increase in activity by other EU vessels in Irish waters.



Source: EU Scientific, Technical and Economic Committee for Fisheries (STECF) – The Economic Performance of the EU Aquaculture Sector; Bord Iascaigh Mhara (BIM);

Fluctuations in quota share remain as always a key influence on the economic prospects of the fleet. Quotas are determined at the December meeting of the Council of Ministers held in Brussels each year. The 2019 Annual Fisheries Negotiations concluded with an overall increase of 30% in whitefish quota for the Irish fleet. The quota for mackerel and nephrops, two of the top earning species for the Irish fleet did however see a reduction in quota in certain areas.

An important policy development for the fishing sector in February 2019 was the launch of Ireland's first industry-led strategy for inshore fisheries which is aiming to maximise the economic potential of the sector and support Ireland's coastal communities. The *Irish Inshore Fisheries Sector Strategy 2019-2023* sets out the vision for the future of the sector which comprises of small fishing vessels (up to 12 metres overall length). The EU economic report on the EU fishing fleet (STECF 18-07) indicates that there were 908 active vessels registered in the small-scale coastal fleet in 2016.

¹⁸ The Business of Seafood 2018. Bord Iascaigh Mhara. Available at: <http://www.bim.ie/media/bim/content/publications/corporate-other-publications/BIM-Business-of-Seafood-2018.pdf>

Marine Aquaculture

In 2018, the total production of the industry was 37,000 tonnes with 288 production units engaged in the sector. Farmed shellfish and farmed finfish production accounted for 65% and 35% of overall aquaculture production volume respectively. Salmon continued to be the most valuable seafood export in 2018 with a total produce of 12,200 tonnes, whilst the value of shellfish grew, mainly driven by the high demand for shellfish in the Chinese market.¹⁹

Table 13 shows turnover, GVA, and employment for 2014, 2016 and 2018, as well as the percentage changes between 2014 and 2016 and between 2016 and 2018. Figure 12 illustrates the trends for both turnover and employment over the 2008-2018 period.

PROFILE		
Finfish	Shellfish	
<ul style="list-style-type: none"> • Salmon • Seawater Trout 	<ul style="list-style-type: none"> • Rope Mussels • Clams • Bottom Mussels • Scallops 	<ul style="list-style-type: none"> • Gigas Oysters • Abalone • Edulis Oysters • Sea Urchins

Table 13: Marine Aquaculture turnover, GVA, employment, 2014, 2016 and 2018

Marine Aquaculture	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	116,299	167,166	176,000	44%	5%
GVA €000's	49,163	98,400	100,320	100%	2%
Employment FTEs	941	1,030	1,925	9.5%	87%
Location of activity	Shellfish aquaculture activities are widely distributed across the coast of Ireland, with particular concentrations in Co. Donegal, Connemara, Co. Galway, West Cork, Co. Waterford, Co. Wexford, and Carlingford Lough, Co. Louth. Finfish aquaculture is mainly restricted to the Western seaboard in counties Donegal, Mayo, Galway, Kerry and Cork.				

Source: Scientific, Technical and Economic Committee for Fisheries (STECF) Economic Report of EU aquaculture sector (STECF-18-19); Bord Iascaigh Mhara (BIM) Aquaculture survey; BIM data on behalf of the JRC (European Joint Research Centre).

The turnover generated by marine aquaculture in 2018 was estimated at €176 million. Total GVA generated was estimated at more than €100 million. Although turnover increased between 2016 and 2018 by 5% with a smaller increase of 2% in GVA in the same period, aquaculture output fell post 2017, driven mainly by a reduction in finfish production. As can be seen from Table 13, the value of

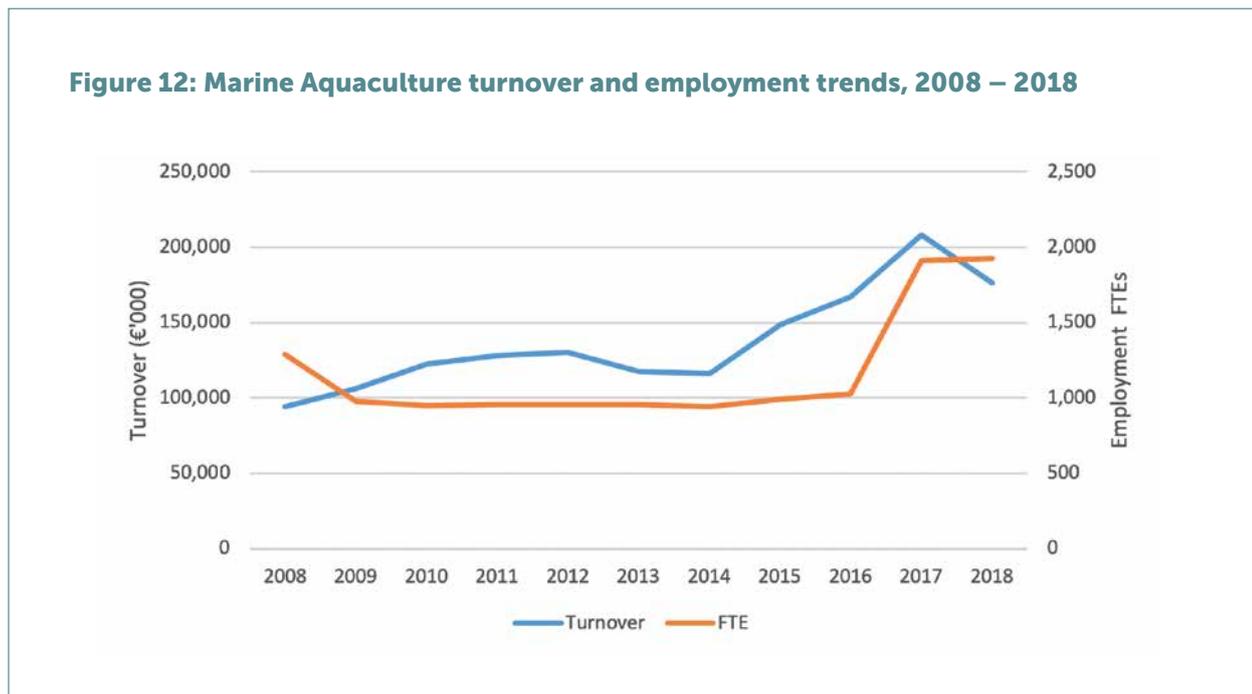
¹⁹ The Business of Seafood 2018. Bord Iascaigh Mhara. Available at: <http://www.bim.ie/media/bim/content/publications/corporate-other-publications/BIM-Business-of-Seafood-2018.pdf>

In 2018,
total marine
aquaculture
production
was

37,000 
tonnes



the sector in terms of GVA and turnover increased by 100% and 44% respectively from 2014 to 2016 to give GVA and turnover of €98 and €167 million in 2016, respectively. According to BIM statistics, employment in the aquaculture industry increased by 87% from 1,030 FTEs in 2016 to 1,925 FTEs in 2018.



Source: EU Scientific, Technical and Economic Committee for Fisheries (STECF) – The Economic Performance of the EU Aquaculture Sector; Bord Iascaigh Mhara (BIM); Figures for 2018 come from Bord Iascaigh Mhara (BIM) collated on behalf of the JRC (European Joint Research Centre) and from BIM Aquaculture survey

From a policy perspective, the National Strategic Plan for Sustainable Aquaculture Development (NSPSAD) has set a target of a twofold increase in production quantity by 2023. A comprehensive review of the Irish aquaculture licensing system was completed in 2017 and indicated persisting administrative problems concerning licensing of aquaculture continuing to hamper the development of the sector²⁰. In 2017 the Minister for Agriculture, Food and the Marine made 109 license determinations. This increased to 305 in 2018. The downturn in salmon farm output in 2018 has been partly attributed to licensing backlogs by the industry although others have pointed to other environmental factors such as sea lice and jelly fish blooms in the summer of 2018. BIM have stated that the annual 39% drop in volume has been driven by the natural production cycle of Irish organic salmon. A similar fall in salmon production was observed in Scotland in 2018. Concerns amongst the public, and the angling community in particular, on the environmental impacts of farmed salmon have been growing²¹. Integrated Multi-Trophic Aquaculture, where multiple complementary species of plant and animals are combined in one operation has been proposed by some academics, policy and industry actors as a means to achieve the dual aim of economic growth and environmental sustainability²².

²⁰ Independent Aquaculture Licensing Review Group (2017). Review of the Aquaculture Licensing Process <http://www.fishingnet.ie/media/fishingnet/content/ReviewoftheAquacultureLicensingProcess310517.pdf>

²¹ Hynes, S. Skoland, K., Elisa Ravagnan, E., Gjerstad, B., Vatland Krøvel, A. (2018) Public attitudes toward aquaculture: An Irish and Norwegian comparative study, *Marine Policy*, 96, 1-8.

²² van Osch, S.V., Hynes, S., Freeman, S., O'Higgins, T. (2019). Estimating the Public's Preferences for Sustainable Aquaculture: A Cross Country Comparison. *Sustainability*, 11, 569.



Seafood Processing

The Irish seafood processing industry is comprised of approximately 160 companies with 25 of them having generated revenues of more than €10 million in 2018. Total seafood exports in 2018 was an estimated €653 million according to BIM. France remains the largest market in value terms for Irish seafood exports, accounting for 22.5% of total seafood products export value. Key exporting products in France are salmon, oysters and crabs.

Other important export markets were the UK (mainly for seafood for use in fish and agricultural feeds, seafood flours, meals and pellets), Spain (mainly for monkfish and flat fish), Italy (mainly for Dublin bay prawns), China (mainly for crabs and molluscs) and Nigeria (mainly for blue whiting and mackerel).²³ Bord Bia have identified Asia as a key growth market for seafood exports; noting a 60% increase in seafood exports to Japan over the period 2016 to 2018. The seafood processing industry is comprised of finfish, shellfish, smoked, pelagic and whitefish operators. Shellfish companies accounted for the largest number of fish processing companies in Ireland. However, many companies specialise in more than one species.

PROFILE

- Preparation and preservation of fish, crustaceans and molluscs
- Production of fish, crustacean and mollusc products
- Production of fishmeal for human consumption or animal feed
- Production of meals and solubles from fish and other aquatic animals unfit for human consumption
- Activities of vessels engaged only in the processing and preserving of fish
- Processing of seaweed

Table 14: Seafood Processing turnover, GVA, employment, 2014, 2016 and 2018

Seafood Processing	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	517,050	602,287	563,741	16.5%	-6.5%
GVA €000's	135,211	172,146	161,129	27%	-6.5%
Employment FTEs	2,360	2,429	2,383	3%	-2%
Location of activity	The sector is concentrated in the coastal regions of Donegal, Mayo, Cork, Kerry, Galway, the North East and the South East				

Source: CSO – Census of Industrial Production (CIP) REV 2: NACE Four-Digit Code: 10.20; BIM Business of Seafood 2018²⁴

Table 14 shows the turnover, GVA, and employment for 2014, 2016 and 2018 (estimated), as well as the percentage changes in the 2014-2016 and 2016-2018 periods. Figure 13 shows the trends for turnover and employment over the 2008-2018 period. Turnover generated by seafood processing in 2014 was €517 million, while total GVA was €135 million. Turnover and GVA increased between 2014 and 2016 by 16.5% and 27% respectively. Employment in the seafood processing industry was 2,429 FTEs in 2016, which is a 3% increase with respect to employment in 2014.

²³ The Business of Seafood 2018. Bord Iascaigh Mhara. Available at: <http://www.bim.ie/media/bim/content/publications/corporate-other-publications/BIM-Business-of-Seafood-2018.pdf>

²⁴ See Appendix 1 for details on the methodology.

The seafood processing industry experienced a difficult year in 2018. Estimates suggest that turnover generated by the sector in 2018 was approximately €563 million, representing a 6.5% decrease in activity between 2016 and 2018. Estimated GVA also decreased by 6.5%, giving a total GVA value of €161 million in 2018. Following the same contractionary business dynamics, employment decreased from 2,429 FTEs in 2016 to 2,383 FTEs in 2018. According to BIM, the economic downturn in the industry is partially associated with rising raw material costs which affected many small seafood processing enterprises in 2018, leading to a 3% decline in the number of enterprises in the sector²⁵. The fall in production from the Irish aquaculture industry in 2018 also has had knock on effects on the seafood processing industry. Nevertheless, shellfish processing companies experienced a 14% growth in 2018, whilst consumers demand for processed seafood products does not exhibit any declining trends in recent years.

Figure 13: Seafood processing turnover and employment trends, 2008-2018



Source: CSO – Census of Industrial Production (CIP) 2012 – REV 1: NACE Four-Digit Code: 15.02; REV 2: NACE Four-Digit Code: 10.20; Bord Bia Export Performance and Prospects 2014-2015 and Business of Seafood 2018 report²⁶

Developing greater processing scale to capitalise on the increased supply of output from aquaculture and landings into Ireland from other countries, is considered as a key driver for growth in the industry. However, government policy indicates that any expansion should be attained in an environmentally efficient manner.²⁷ Water pollution, waste management, and carbon dioxide (CO₂) emissions associated with intensive energy and fuel use for the transportation of products, are the major environmental challenges faced by the seafood processing sector. In light of the environmental sustainability concerns for the seafood sector, BIM launched a certification standard (Responsibly Sourced Seafood standard) in March 2017, which compliments Bord Bia's Origin Green sustainability initiative.

²⁵ The Business of Seafood 2018. Bord Iascaigh Mhara. Available at: <http://www.bim.ie/media/bim/content/publications/corporate-other-publications/BIM-Business-of-Seafood-2018.pdf>

²⁶ See Appendix for details on the methodology.

²⁷ DAFM (2017). Food Wise 2025-A 10-year vision for the Irish agri-food industry. Department of Agriculture, Food and the Marine, Dublin. Available at: <https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarks/agri-foodandtheeconomy/foodwise2025/report/FoodWise2025.pdf>

Oil and Gas Exploration and Production



Oil and natural gas remain essential primary energy inputs to all major sectors in the Irish economy. In 2017 oil and gas accounted for 49% and 29% respectively of Ireland's total energy requirements, with transport having consumed 72% of supplied oil, and industry sectors having consumed 42% of supplied gas. Energy demand from 2018 to 2030 is expected to rise by 22%. As Ireland imports about 31% of its gas and 100% of oil via the UK, energy security concerns exist in light of Ireland's lack of direct connection to the main EU energy markets after Brexit.

Moreover, Ireland has set energy and emissions reduction targets requiring an estimated investment of €7.6 billion between now and 2027 for Ireland's transition to a low carbon society.²⁸ Emissions associated with oil and gas imports from outside of Europe are 30% higher than emissions from indigenous and European oil and gas supplies.²⁹ Consequently, the substitution of oil and gas imports with indigenous supplies could lead to significant carbon emissions reductions and socio-economic gains as oil/gas projects increase employment and generate higher taxation returns.

PROFILE

- Extraction of crude petroleum
- Extraction of natural gas
- Support activities and natural gas extraction, including exploration services

Table 15: Oil and Gas Exploration and Production, GVA, employment, 2014, 2016, and 2018

Oil and Gas Exploration and Production	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	199,645	597,282	819,000	199%	37%
GVA €000's	23,957	71,674	106,470	199%	48.5%
Employment FTEs	85	145	154	70.5%	6%
Location of activity	The sector is concentrated in the coastal regions of Donegal, Mayo, Cork, Kerry, Galway and the South East				

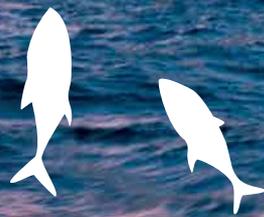
Source: CSO - Census of Industrial Production REV 2: NACE Four Digit Codes: 06.10, 06.20, 09.10; SEMRU Company Survey; Petroleum Affairs Division, Department of Communications, Energy and Natural Resources; Figures for 2017 and 2018 are estimates³⁰

Table 15 shows the turnover, GVA, and employment for 2014, 2016 and 2018 (estimated) as well as the percentage changes in each for the 2014-2016 and 2016-2018 periods. Figure 14 shows the trends for both turnover and employment over the 2008-2018 period.

²⁸ SEAI (2018). Energy in Ireland. 2018 Report. Sustainable Energy Authority of Ireland (SEAI), Dublin.

²⁹ Irish Offshore Operators' Association (2019). Value of the Indigenous Oil and Gas Industry to Ireland. Report prepared by PwC. Irish Offshore Operators' Association, Dublin.

³⁰ See Appendix 1 for details on the methodology.

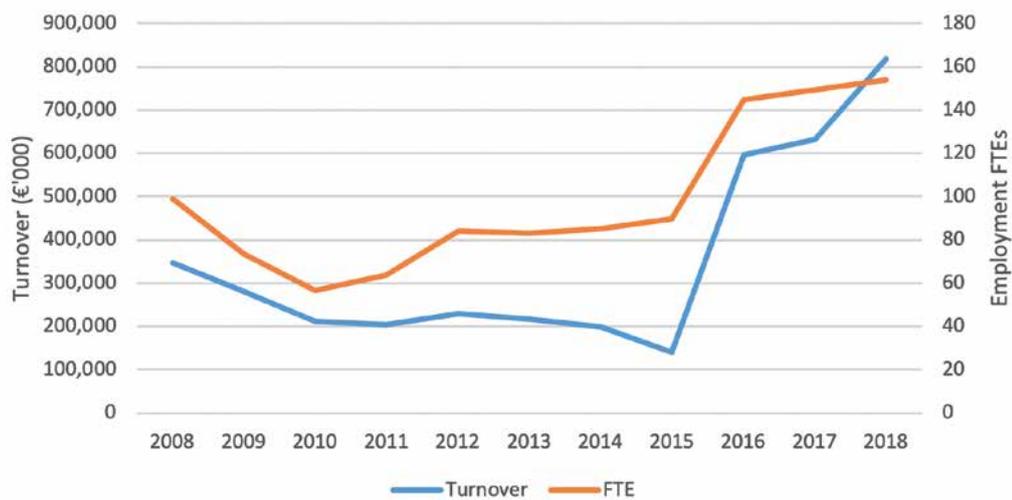


Energy demand from 2018 to 2030 in Ireland is expected to rise by



Ireland's turnover generated by the oil and gas exploration and production industry in 2014 was €200 million. Total GVA generated was €24 million. After considerable delays, production of gas commenced from the Corrib gas field at the end of December 2015. Furthermore, 28 Licensing Options were awarded during 2016 following a positive response to the Atlantic Margin Licensing Round. These developments have had a significant impact on the overall economic value of the Irish oil and gas sector since 2016 onwards as shown in Table 15 and Figure 14.

Figure 14: Oil and Gas Exploration and Production turnover and employment trends, 2008-2018



Source: CSO - Census of Industrial Production REV 2: NACE Four Digit Codes: 06.10, 06.20, 09.10; SEMRU Company Survey; Petroleum Affairs Division, Department of Communications, Energy and Natural Resources; Figures for 2017 and 2018 are estimates³¹

There was a large increase (199%) in both turnover and GVA between 2014 and 2016 following Corrib coming on line. Turnover in 2016 exceeded €597 million and GVA was more than €71.5 million. Employment in the sector also increased from 85 FTEs in 2014 to 145 FTEs in 2016, which shows an increase of 70.5%. Estimates suggest that turnover generated by the sector in 2018 was nearly €819 million, representing an increase in activity of 37% between 2016 and 2018. A significant increase in the price of gas in Ireland in 2018 has contributed to this growth in turnover. Table 15 also shows that estimated GVA increased by 48.5%, from €71.6 million to €106.5 million in the same period, while employment increased from 145 FTEs in 2016 to 154 FTEs in 2018.

PwC's latest annual Irish oil and gas industry survey³² indicated that 63% of companies in the industry, both those already here and those with an interest in doing business here, rate the outlook for Ireland's oil and gas sector out to 2021 as "favourable". In a positive development for the industry, Europa Oil and Gas have increased exploration efforts to access an estimated two trillion cubic feet (TCF) of gas at a site off the coast of Mayo. The company hope to use the infrastructure already in place to process gas from the Corrib field, if its efforts are successful.

This positive development aside, in March 2019 a proposed Bill to limit future oil and gas exploration has been voted through the Dáil to the legislative stage. The Climate Emergency Measures Bill seeks to amend the Petroleum and Other Minerals Development Act to limit the issuing of new licenses for the exploration and extraction of fossil fuels. If passed into law it would in effect ban any future oil and gas exploration and would have serious consequences for the future development of the industry.

³¹ See Appendix 1 for details on the methodology.

³² PwC (2018). Oil and gas: Survey 2018 <https://www.pwc.ie/publications/2018/2018-oil-and-gas-survey.pdf>

Marine Manufacturing, Construction and Engineering

Historically, the island of Ireland had a strong shipbuilding tradition and significant marine manufacturing capacity. While the vast majority of world shipbuilding capacity has now shifted to Far Eastern countries, Ireland still has a significant marine construction, manufacturing and engineering industry. The profile of the marine manufacturing, construction and engineering industry in the Republic of Ireland is mainly small and medium sized enterprises (SME's).

Table 16 illustrates the turnover, GVA, and employment for 2014, 2016, and 2018 (estimated) as well as the % change in each for the 2014-2016 and 2016-2018 periods. The trends for both turnover and employment over the 2010-2018 period is illustrated in Figure 15.

PROFILE

- Boat and Related Equipment Manufacturing
- Boat Manufacturing
- Boat and Ship Repair
- Net manufacturing
- Water Construction
- Marine Industrial Engineering
- Other Marine Manufacturing
- Marine Consultancy

Table 16: Marine Manufacturing, Construction and Engineering turnover, GVA, employment, 2014, 2016 and 2018

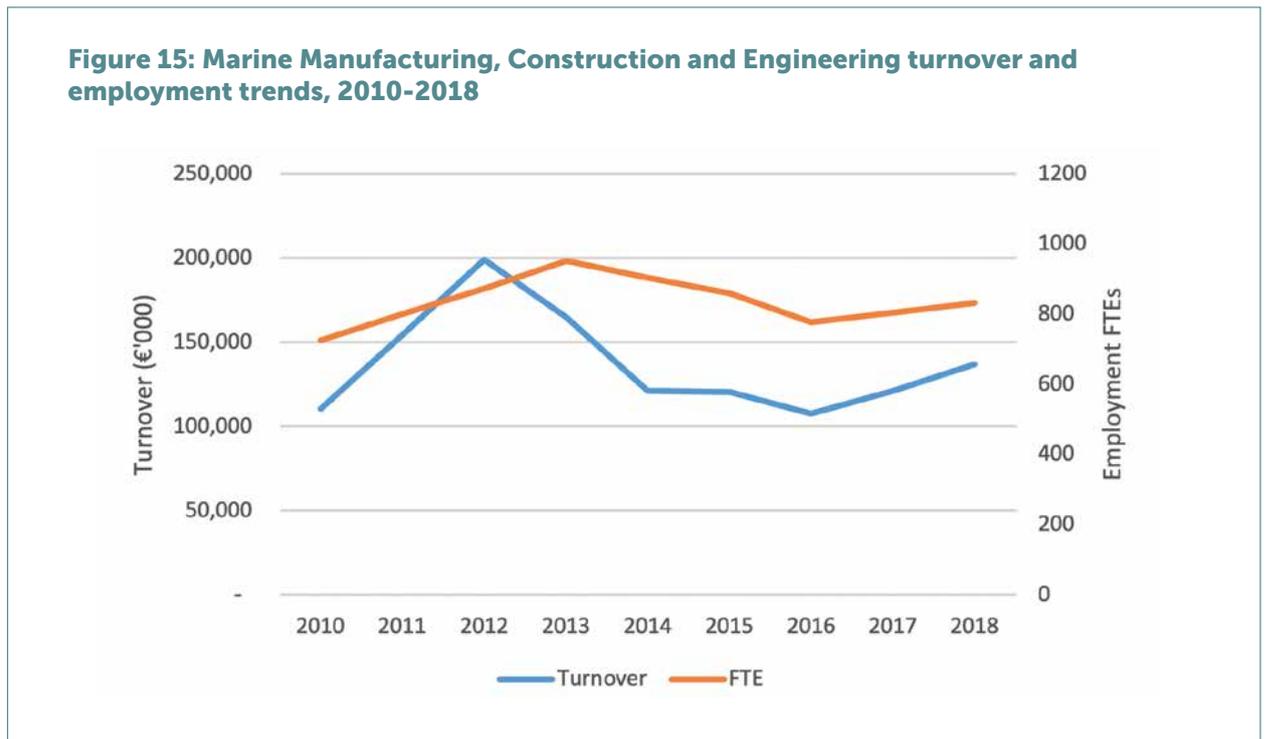
Marine Manufacturing	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	121,000	107,605	136,776	-11%	27%
GVA €000's	64,959	60,977	67,888	-6%	11%
Employment FTEs	906	779	834	-14%	7%
Location of activity	Companies involved in marine manufacturing are found throughout Ireland, both along the coast and inland. However, there are clusters of particular marine product manufacturing to be found in certain areas, particularly in Co. Donegal (marine industrial engineering), and counties Galway and Cork (boat building). Companies involved in water construction are mainly located in Dublin and Offaly.				

Source: CSO – Census of Industrial Production; CSO – Building and Construction Inquiry; REV 2: NACE Four-Digit Codes: 30.11, 30.12, 33.15, 42.91; CSO – Industrial Turnover Index; CSO – National Household Survey; SEMRU Company Survey; Figures for 2017 and 2018 are estimates³³

³³ See Appendix 1 for details on the methodology.

The total turnover contribution of the marine manufacturing, construction and engineering industry in 2016 was €107.6 million. 2017 estimates indicate a 13% increase in turnover to €121.6 million. GVA generated by the industry in 2016 was €60.9 million. According to 2017 estimates, GVA increased to €63.1 million. Employment in the sector was 779 FTEs in 2016.

Estimates in Table 16 suggest that the turnover produced by the sector in 2018 was €136.7 million, indicating a notable rise in activity of 27% between 2016 and 2018. Also, the estimated GVA increased by 11% to €67.8 million in that time period, whereas employment figures increased by 7% to 834 FTEs.



Source: CSO – Census of Industrial Production; CSO – Building and Construction Inquiry; REV 2: NACE Four-Digit Codes: 30.11, 30.12, 33.15, 42.91; CSO – Industrial Turnover Index; CSO – National Household Survey; SEMRU Company Survey; Figures for 2017 and 2018 are estimates³⁴

Despite the industry experiencing a continuous decline in turnover in the 2013 to 2016 period, as shown in Figure 15, growth has returned to the industry from 2016-2018 period. While the outlook for the industry is positive, one issue raised by a number of companies in the SEMRU enterprise survey was the difficulty they are having in getting skilled manual labour for skills such as welding, joinery, painting, fabrication, etc. As one respondent put it “we can get loads of young people from college with degrees in engineering but it’s the actual trades and skills to produce the end product that we are missing”. The lack of such skilled individuals could increase costs as manufacturers pay more to fill those jobs vacancies or use other less efficient options to complete the required work. The third level sector should consider if the programmes are being made available to produce the particular types of skilled workforce required in marine manufacturing. This will become even more relevant for the industry if the expected growth in the coming years in marine renewable energy materialises. Such growth should mean increased demand for products and services from the marine manufacturing industry also.

³⁴ See Appendix for details on the methodology.



Emerging Marine Industries

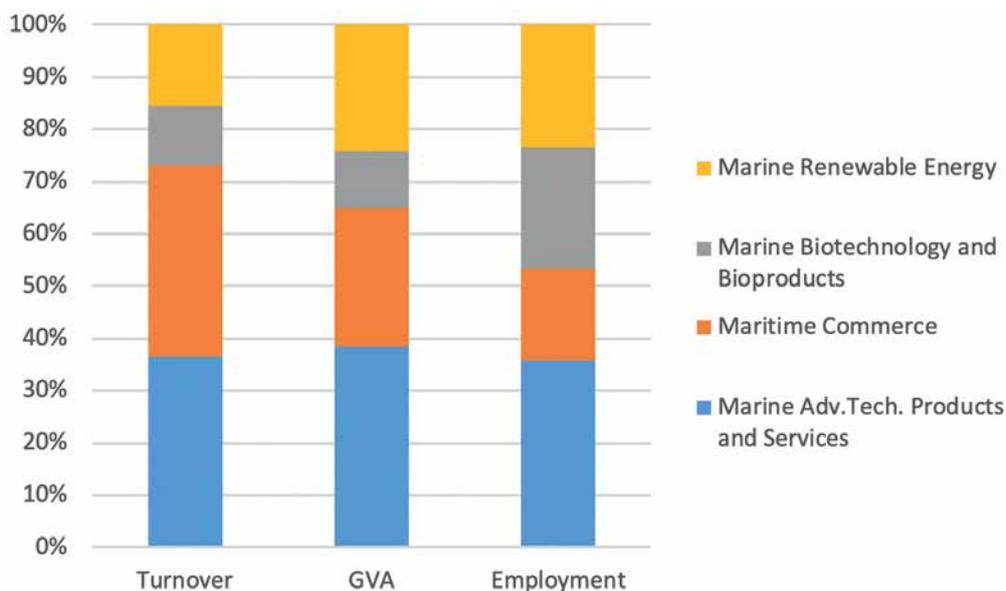
Emerging Marine Industries in 2016 had a turnover of €383 million and provided employment to 1,945 FTEs. These industries represent 7% of the turnover and 6% of the employment in Ireland's ocean economy. In 2018, Emerging Marine Industries had an estimated turnover of €459 million and provided estimated employment to 2,084 FTEs.

EMERGING MARINE INDUSTRIES IDENTIFIED AND PROFILED BELOW INCLUDE:

- Marine Commerce
- Advanced Marine Technology Products and Services
- Marine Biotechnology and Bio-products
- Marine Renewable Energy

Figure 16 shows the relative contribution of each of these sectors to the overall turnover, employment and GVA of the emerging marine industries in 2016. Amongst the emerging industries, marine commerce remains the largest contributor to the ocean economy in terms of turnover in 2016 and 2018, followed by marine advanced technology products and services.

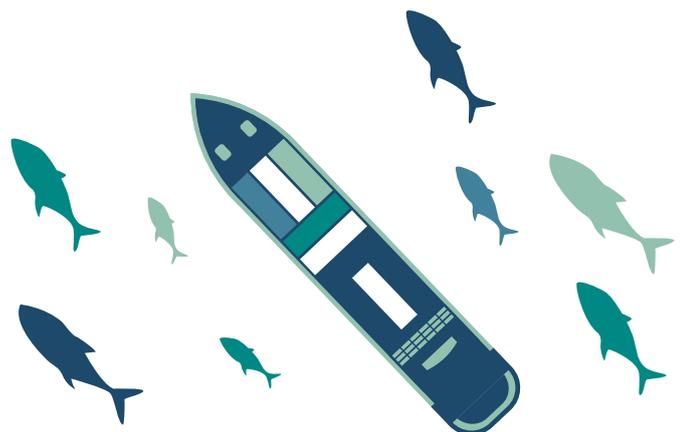
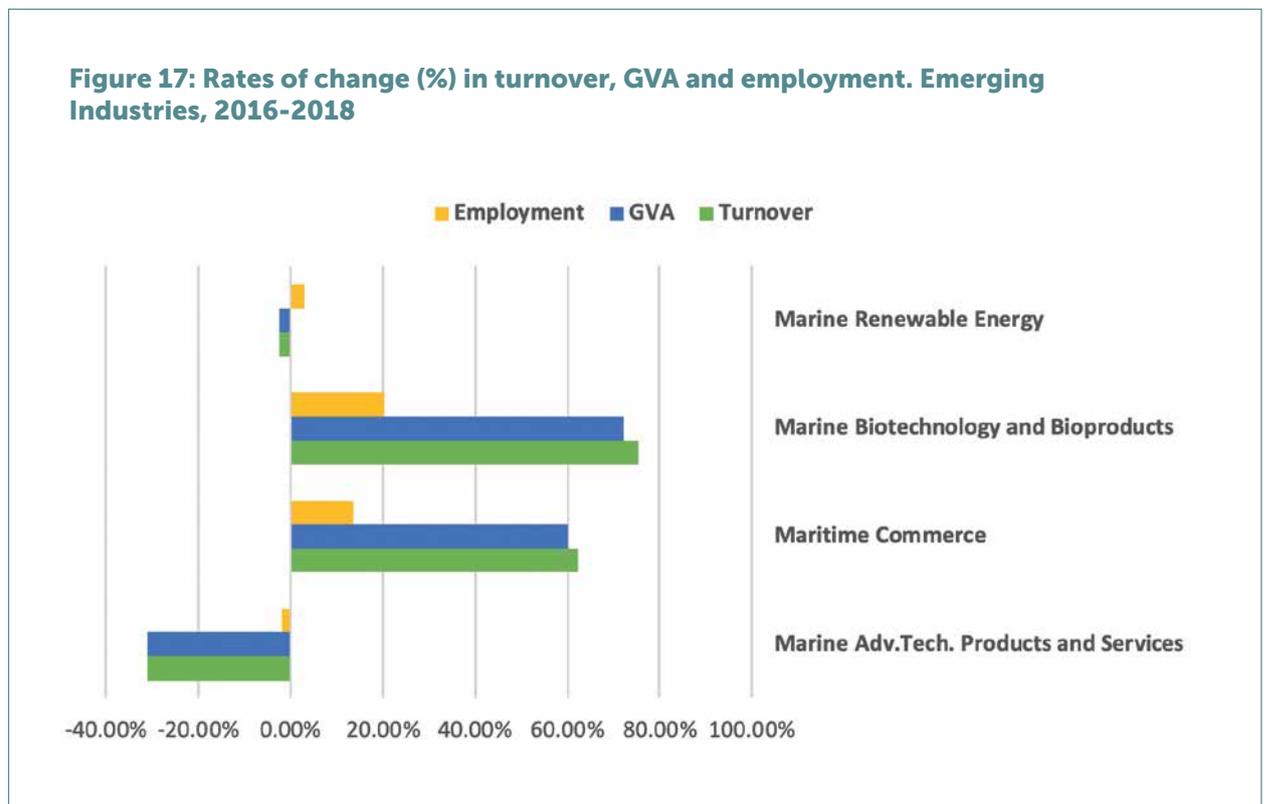
Figure 16: Relative contribution (%) of each sector within emerging marine industries to turnover, GVA and employment, 2016



In terms of GVA, marine commerce was once again the largest contributor in 2018 from the emerging industries, followed by the marine advanced technology products and services sector and the marine renewable energy sector, respectively.

The marine advanced technology products and services sector was again the largest contributor to employment in the emerging industries in 2018, followed by biotechnology and bio-products and marine renewable energy, respectively.

Figure 17 shows the rate of change in turnover, GVA and employment for the emerging industries in the 2016-2018 period. Marine biotechnology and bio-products shows the largest % increase in GVA, followed by marine commerce. While remaining the industry with arguably one of the greatest growth potentials here due to energy and climate policy demands the marine renewable energy industry actually experiences a 2% reduction in GVA in the 2016-2018 period. Details on economic trends by industry are presented in the following sections for 2010 and from 2012 to 2018.

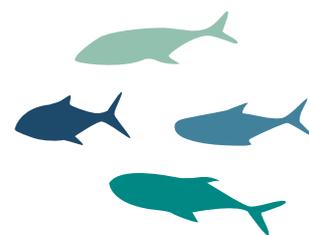


In 2018, the
Emerging
Marine
Industries
provided
estimated
employment to

2,084 FTEs



Advanced Marine Technology Products and Services



Ireland is recognised as one of the world leaders in the advancement of marine technology products and services or “blue tech”. In particular Ireland’s investment in seabed mapping and “digital oceans” technology for real-time data gathering and research has also accelerated developments in the wider ocean economy by contributing to environmental monitoring, the development of ocean energy technologies and marine security and improved information for oil and gas exploration.

It has been noted that Ireland’s already existing capabilities in ICT and engineering has provided a solid foundation for marine technology markets in areas such as sensors, platforms, advanced materials, subsea communications, robotics, computer vision, simulation, observation, forecasting, informatics and modelling³⁵. These technologies support activity in a number of marine sectors such as oil and gas, shipping and maritime transport, fisheries and aquaculture, and maritime safety, security and surveillance. They also underpin development in emerging sectors such as marine renewable energy, marine environmental monitoring and resource management³⁶.

PROFILE

- Meteorological Consultancy, Products & Services
- Environmental Consultancy, Products & Services
- Hydro-Survey Consultancy, Products & Services
- Aquaculture Technology
- Marine Instrumentation
- Sensors
- Geo-Informatics Services
- Yacht Design

Table 17: Advanced Marine Technology Products and Services turnover, GVA, employment, 2014, 2016, and 2018

Advanced Marine Technology Products and Services	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	80,067	139,681	96,452	74.5%	-31%
GVA €000's	36,106	60,632	41,868	68%	-31%
Employment FTEs	561	695	683	24%	-2%
Location of activity	Technology companies are located across Ireland, both on the coast and inland. However, the majority of companies are located within the larger cities, primarily Galway, Cork and Dublin.				

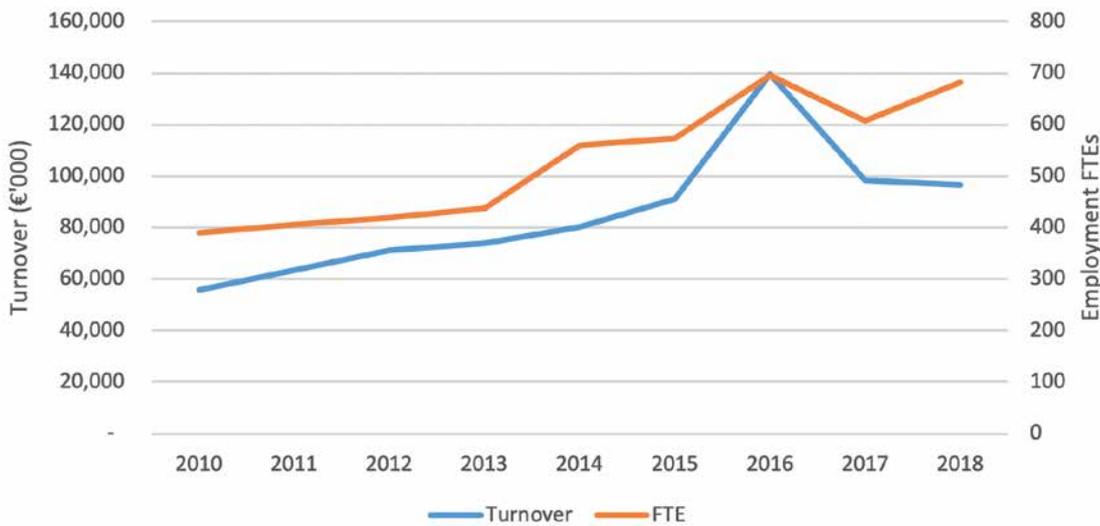
Source: SEMRU Marine Enterprise Survey

³⁵ Government of Ireland, Inter-Departmental Marine Coordination Group (MCG) (2017) National Marine Research & Innovation Strategy 2017–2021. <https://www.ouroceanwealth.ie/sites/default/files/sites/default/files/Publications/2017/NationalMarineResearchInnovationStrategy2021.pdf>

³⁶ Government of Ireland, Inter-Departmental Marine Coordination Group (MCG), “Harnessing Our Ocean Wealth - An Integrated Marine Plan (IMP) for Ireland,” July 2012, Briefing Document Part II: Sectoral Briefs

As shown in Table 17, turnover in 2014 was €80 million, GVA was €36 million and employment was 561 FTEs. There was a remarkable increase in turnover, GVA and employment from 2014 to 2016. In 2016, turnover increased to €139.7 million which was a 74.5% increase with respect to the previous reporting period, while GVA increased to €60.6 million which was a 68% increase from 2014. Increases in turnover and GVA were accompanied by a 24% increase in employment. The turnover generated by the advanced marine technology products and services sector in 2018 was approximately €96.5 million, which represents a 31% drop in economic returns with respect to 2016. Total GVA generated in 2018 was about €42 million, representing a drop in activity of 31% in the same period. Employment in the sector was 683 FTEs in 2018, which shows a moderate decrease of 2% in the 2016-2018 period.

Figure 18: Advanced Marine Technology Products and Services turnover and employment trends, 2010, 2012-2018



Source: SEMRU Marine Enterprise Survey

Figure 18 shows the trends for both turnover and employment over the 2010-2018 period and also illustrates the effort that Ireland has made in recent years in infrastructure investment to support the development of this sector into the future. This will continue to enhance Ireland's attractiveness as a location for advanced marine technology research and innovation firms. Fluctuations in turnover in this industry is often related to funding cycles for the development of new technology in the marine space. In 2019 the Marine Institute (Industry-Led Awards) and the Department of Business, Enterprise and Innovation (Disruptive Technologies Innovations Fund) awarded funding to a number of marine technology projects in the areas of robotics, the internet of things and data analytics.



Marine Commerce

Marine commerce is a growing service industry in Ireland consisting of legal services, financial services, insurance and ship surveying. The industry generates value added services for a variety of marine categories, mainly, shipping and maritime transport, tourism and leisure, fisheries and aquaculture as well as offshore energy. International companies and their marine related divisions dominate this industry's activity in Ireland.

The profile of marine commerce used for the purpose of this report is necessarily narrow as other activities such as ship leasing and ship management services, which generally would be considered as important marine commerce activities, are already accounted for within the NACE codes used to calculate the figures for the Shipping and Maritime Transport industry.

Table 18 presents the turnover, GVA and employment for this sector in 2014, 2016 and 2018. In addition, the % change for the 2014-2016 and 2016-2018 periods are also given in the table. Figure 19 illustrates the trends for both turnover and employment over the 2010-2018 period.

PROFILE:

- Marine Financial Services
- Marine Legal Services
- Marine Insurance
- Ship Surveyors

Table 18: Marine Commerce turnover, GVA, employment, 2014, 2016, and 2018

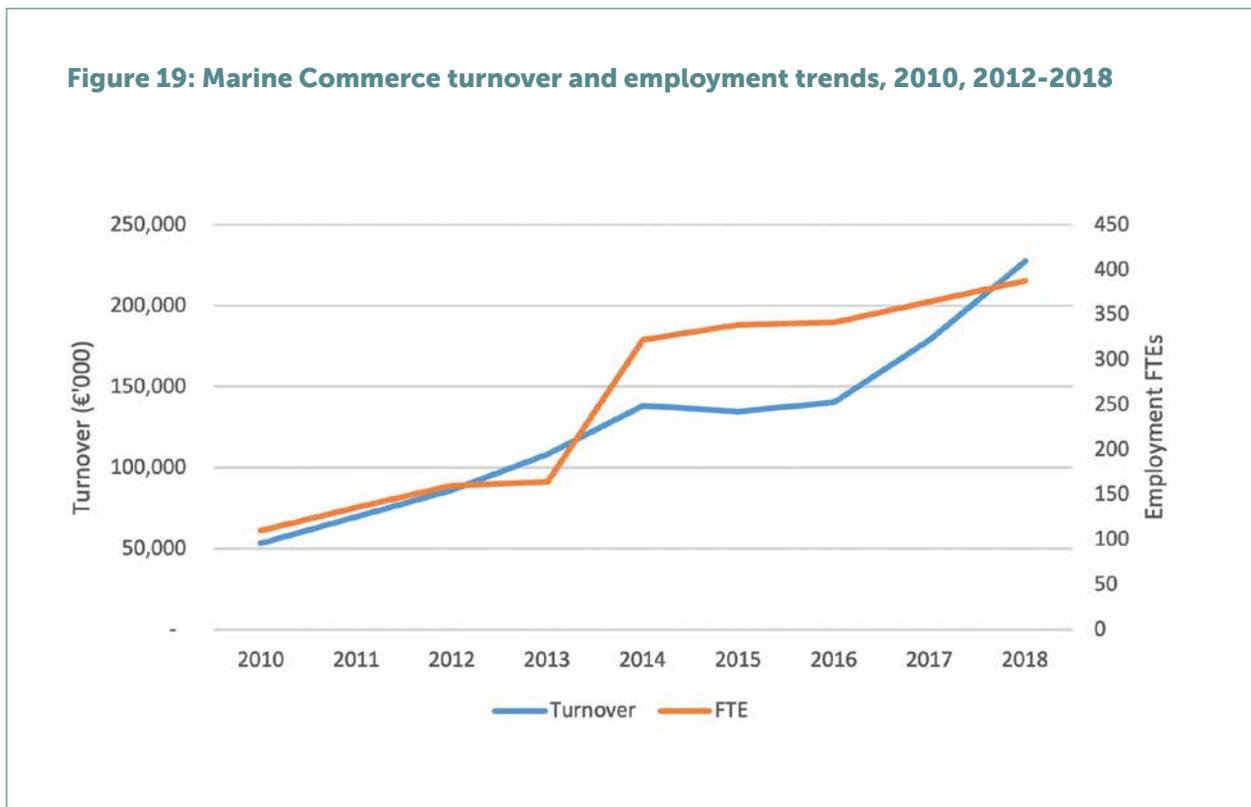
Marine Commerce	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	138,449	140,731	228,146	2%	62%
GVA €000's	42,166	41,763	67,704	-1%	61%
Employment FTEs	322	342	389	6%	13.5%
Location of activity	Companies that provide marine commerce services are primarily located in Dublin, Cork and Galway				

Source: SEMRU Marine Enterprise Survey

In 2016, €140 million in turnover and €42 million in GVA was generated by the marine commerce industry. Turnover increased between 2014 and 2016 by 1.65%, with a marginal sized decrease in GVA over the same period. Employment in the sector grew between 2014 and 2016 by 6% to 342 FTEs.

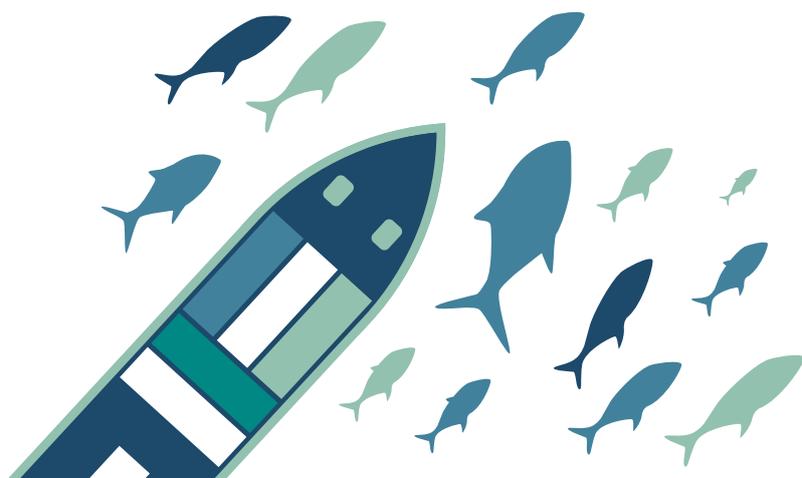
According to 2018 estimates, turnover was €228.1 million indicating a 27% increase in comparison to 2017, and a 62% increase in comparison to 2016. In 2016-2018 period, the total GVA also increased by 61%, whereas employment increased by 13.5% to 389 FTEs.

Figure 19: Marine Commerce turnover and employment trends, 2010, 2012-2018



Source: SEMRU Marine Enterprise Survey

The outlook for the marine commerce industry in Ireland is positive despite the considerable level of uncertainties generated by Brexit discussions. Although global downscaling is taking place in marine financial services, due to excess shipping capacity and oversupply to the market, marine financial services in Ireland are expected to continue to grow in the coming years as opportunities develop connected with the potential relocation of financial institutions from Britain to Ireland.



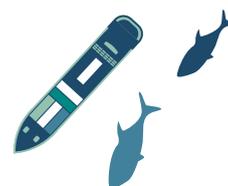


In 2016,
marine
commerce
generated
in GVA

€42m



Marine Biotechnology and Bio-products



Marine biotechnology explores the chemical and biological properties of the oceans. Marine biotechnology creates new knowledge, value and market opportunities by developing new products from marine biological materials. Novel compounds can be identified and derived from marine organisms, bacteria and viruses to further provide components for cosmetics, healthcare, food, agricultural, chemical and other products.

Ireland's emerging marine biotechnology and bio-products industry is diverse, spanning different markets, such as food, pharmaceuticals, medical devices, and contributing to an array of novel products and processes. The sector also includes seaweed harvesting which is a traditional activity in Ireland that generates revenues and offers employment to coastal areas. The main commercial species harvested in Ireland are *Ascophyllum nodosum*, *Laminaria hyperborea* and miscellaneous red seaweeds.

PROFILE

- Seaweed Harvesting including foods, toothpaste and paints and fish feeds in aquaculture
- Whole or unprocessed foods and processed foods for consumption
- Plant fertilisers in agriculture
- Bioactives for health, medicine and cosmetics
- Industrial texturants,
- Animal feeds in agriculture
- Energy and biofuels

Table 19 presents the turnover, GVA and employment for this sector in 2014, 2016 and 2018, as well as the percentage changes in each for the 2014-2016 and 2016-2018 periods. Figure 20 shows the trends for both turnover and employment over the 2010-2018 period.

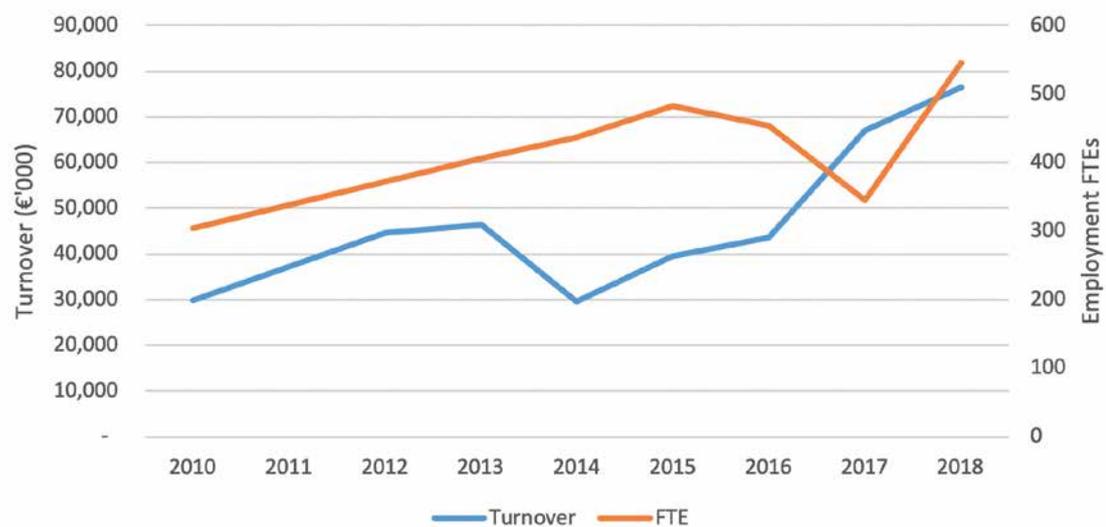
Table 19: Marine Biotechnology and Bio-products turnover, GVA, employment, 2014, 2016, and 2018

Marine Biotechnology and Bio-products	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	29,512	43,610	76,409	48%	75%
GVA €000's	4,626	16,989	29,767	267%	75%
Employment FTEs	436	453	545	4%	20%
Location of activity	Seaweed harvesting takes place around the coast of Ireland, with particular concentrations in Co. Galway, Co. Donegal, Co. Sligo, Co. Kerry and Co. Cork. Other activities in this sector are not confined to coastal counties and have a wide geographical distribution across the country.				

Source: SEMRU Marine Enterprise Survey

The turnover generated in 2016 was €43.6 million, while total GVA generated was €17 million and employment amounted to 453 FTEs. The marine biotechnology and bio-products sector experienced a substantial increase in turnover and GVA from 2014 to 2016. Growth in the sector continued post 2016 with turnover and GVA being equal to €76 and €30 million respectively in 2018. Employment in the sector was 545 FTEs in 2018, which shows an increase of 20% with respect to the previous reporting period. Growth since 2016 has mainly been driven by new entrants to this dynamic industry processing products of higher value and more recently by price increases in the materials harvested and processed.

Figure 20: Marine Biotechnology and Bio-products turnover and employment trends, 2010, 2012-2018

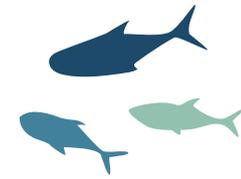


Source: SEMRU Marine Enterprise Survey

Marine biotechnology is incorporated in the EU Blue Growth strategy as an important element in the Bioeconomy Strategy for Europe that can contribute to the meeting of the societal and environmental sustainability challenges faced by Europe.³⁷ The future potential for the Irish marine biotechnology and bio-products sector relates to the development of higher value-added products. However, it has been pointed out that because this industry is dominated by SMEs, their access to funds and the limited power they have to bring marine biotech products to market, moving up the value chain may require “downstream linkages to end-users to whom they can sell or license their innovations, products and processes or who may become investors who can help them survive longer while they validate and de-risk their developments”³⁸.

³⁷ Hurst, D.; Børresen, T.; Almesjö, L.; De Raedemaeker, F.; Bergseth, S. (2016). Marine biotechnology strategic research and innovation roadmap: Insights to the future direction of European marine biotechnology. Marine Biotechnology ERA-NET: Oostende.

³⁸ European Commission (2019) EU Blue Economy Report 2019. Publications Office of the European Union. Luxembourg.



Marine Renewable Energy

The marine renewable energy industry in Ireland includes the generation of power from offshore wind and the development of technologies and energy utilising wave and tidal resources. Wave energy technologies and investments are still mainly at planning and R&D stages worldwide. On the other hand, due to increasing funding support for wind energy and operational experiences gained from offshore oil and gas platforms, significant technological innovations and investment has taken place in offshore wind farm projects at a European and global level³⁹.

The turnover, GVA and employment for marine renewable industry in 2014, 2016 and 2018 as well as the % change in each for the 2014-2016 and 2016-2018 periods are indicated in Table 20. Additionally, Figure 21 illustrates the trends of turnover and employment during the 2010-2018 period.

PROFILE:

- Offshore Wind Energy Production and Services
- Wave Energy Production and Services (Pre-Commercial)
- Tidal Energy Production and Services (Pre-Commercial)

Table 20: Marine Renewable Energy turnover, GVA, employment, 2014, 2016, and 2018

Marine Renewable Energy	2014	2016	2018	2014-2016 (% change)	2016-2018 (% change)
Turnover €000's	26,892	59,002	57,591	119%	-2%
GVA €000's	15,402	38,098	37,187	147%	-2%
Employment FTEs	401	454	467	13%	3%
Location of activity	Ireland's location at the western edge of the Atlantic Ocean means that it is ideally located to take advantage of the emerging opportunities to harness power from marine renewable resources.				

Source: SEMRU Marine Enterprise Survey

The turnover generated by the marine renewable energy sector was €59 million in 2016 which was a 119% increase on 2014. In 2014, total GVA generated was €15 million. In 2016, GVA increased by 147% in comparison to 2014 reaching €38 million. During the period of 2014-2016, employment in the sector also increased by 13% with 454 FTEs in 2016. The higher growth rates of turnover compared to employment indicates an increase in productivity over this period.

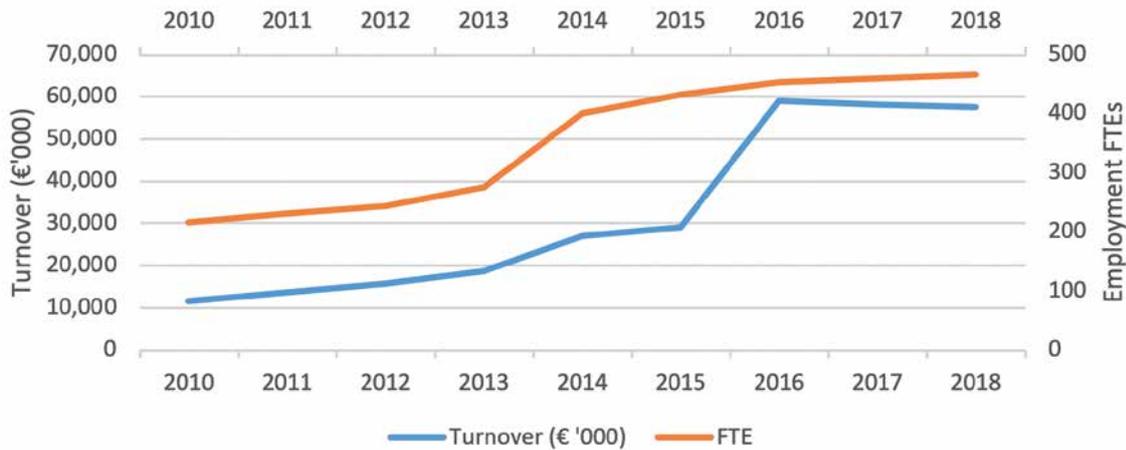
However, as indicated in Table 20, activity in the sector has levelled off. The turnover generated by the sector in 2018 was €57.5 million, representing a slight decline in activity in comparison to 2016. GVA also decreased by 2.4% to €37.1 million, while employment increased marginally by 2.8% in the 2016-2018 period.

³⁹ Government of Ireland, Inter-Departmental Marine Coordination Group (MCG), "Harnessing Our Ocean Wealth - An Integrated Marine Plan (IMP) for Ireland," July 2012, Briefing Document Part II: Sectoral Briefs

Ireland is committed to produce from renewable energy sources at least **16% of all energy consumed by 2020**



Figure 21: Marine Renewable Energy turnover and employment trends, 2010, 2012-2018



Source: SEMRU Marine Enterprise Survey

Figure 21 illustrates the growth in the industry for both employment and turnover since 2010. According to the latest SEMRU Marine Enterprise Survey however, there has been activity declines recorded in some of the companies between 2017 and 2018. 2018 also saw the liquidation of the Irish tidal energy company OpenHydro.

This slowdown in activity aside the prospect for growth in the industry here are positive. Given Ireland’s extensive ocean resources and its position in the Northeast Atlantic, offshore wind in particular still presents a tremendous opportunity. Ireland ranks second to only the UK for gross resource potential in offshore wind in terms of sea area and wind speeds⁴⁰.

A number of offshore wind farms are currently being planned. For example, the Oriel wind farm project is currently in the development stage. This project, based off the coast of Co. Louth, proposes 55 wind turbines that could generate up to 330 megawatt (MW) of energy. Elsewhere, SSE plans to invest between €1bn and €2bn to develop the Arklow Bank Wind Park to its minimum 520 MW potential.

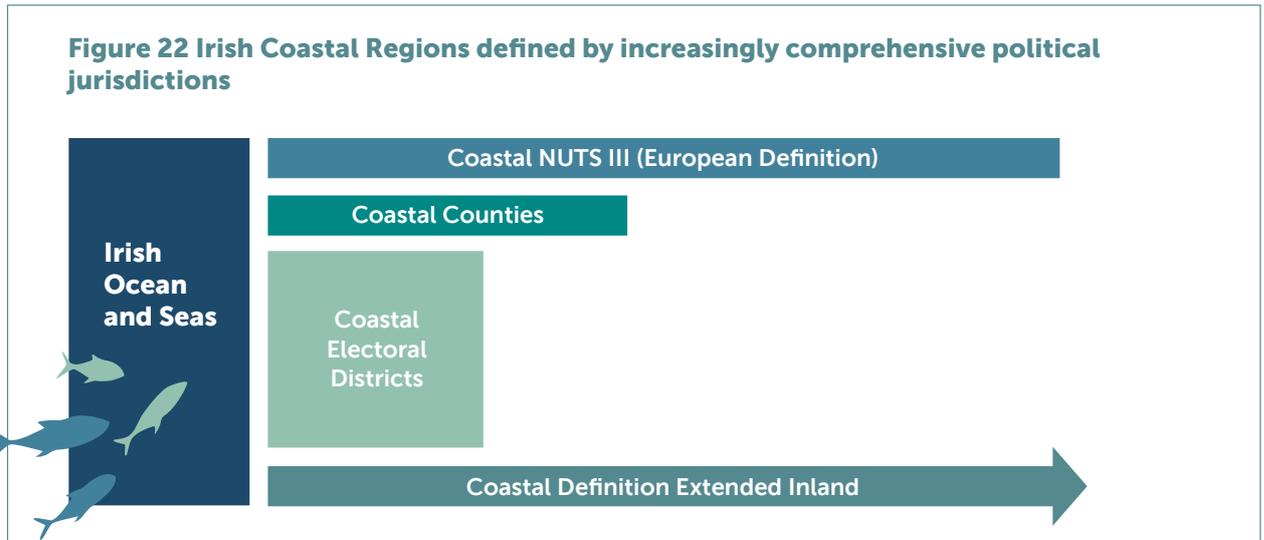
An expansion of offshore renewables will also be required if Ireland is to meet its renewable energy and emissions targets. A recent report by the Sustainable Energy Authority of Ireland⁴¹ indicates that Ireland will fall short of its 16%, 2020 EU renewable energy target. Ireland is also behind in terms of achieving its 2020 and 2030 greenhouse gas emissions reduction targets. Government has also pledged as part of it’s new climate action plan, to generate 70% of the country’s electricity supply from renewable sources by 2030. Given the increasing opposition to onshore wind turbines, the falling costs associated with offshore deployment and new technologies such as floating platforms, it is likely that offshore wind and wave energy will be an important means of reaching these looming targets.

⁴⁰ BVG Associates (2017) Unleashing Europe’s Wind Potential, Available at: <https://windeurope.org/wp-content/uploads/files/about-wind/reports/Unleashing-Europes-offshore-wind-potential.pdf>

⁴¹ SEAI (2019) National Energy Projections 2019. https://www.seai.ie/resources/publications/2019-04_SEAI2019ProjectionsReport_Final.pdf

Ireland's Coastal Economy

Characteristics of Ireland's coastal regions vary based on the definition used. Approximately 40% of Ireland's population live within five kilometres of the coastline, but when considering a European classification, over 90% of the island is considered a coastal zone.



Following Hynes and Farrelly (2012)⁴², and as shown in Figure 22, coastal characteristics are measured at three increasingly comprehensive spatial scales, ranging from the shoreline inward:

Coastal Electoral Districts: a set of electoral districts (EDs) that are immediately adjacent to an ocean or sea, including transitional water bodies. This definition includes 710 of the 3409 electoral districts in Ireland and, as highlighted in Table 21, account for approximately 27% of Ireland's population.

Coastal County: a set of counties which contain a shoreline of any length adjacent to an ocean or a sea, including transitional water bodies. Sixteen of the twenty-six counties in the Republic of Ireland are considered coastal counties under this definition. Approximately 75% of Ireland's population lives in a coastal county.

Coastal NUTS III (European Coastal Region): a set of European standard statistical regions (EU NUTS level III) which contain a shoreline with a sea or ocean, or in which at least half of the population resides within 50km of a sea or ocean. In Ireland, these regions are conglomerates of the counties. When applied to Ireland, this Eurostat definition describes 7 of the 8 NUTS III regions as coastal areas, excluding only the Midlands NUTS III region. This coastal definition includes approximately 94% of the Irish population.

⁴²Hynes, S. and Farrelly, N. (2012). Defining standard statistical coastal regions for Ireland, *Marine Policy* 36: 393–404.

Table 21 Irish population at the ED, County, and NUTS3 coastal region as a percentage of the national population

Population Statistics	
Coastal ED Population	1,302,144 27.35%
Coastal County Population	3,557,125 74.70%
Coastal NUTS3 (EU Coast) Population	4,469,564 93.86%
National Population	4,761,865 100%

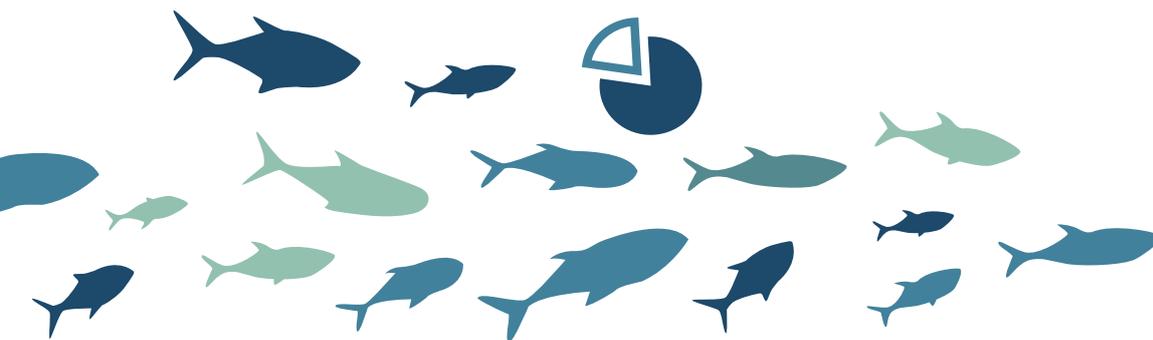
In which the population is presented as a percentage of the national population in **bold**

As seen in Table 22, the length of the Irish coastline is estimated to be 7,711 kilometres, which accounts for approximately 4% of the 184,659 kilometres which make up the European coastline. Using the Coastal NUTS III definition, the 4.4 million people living on the Irish coast make up less than 2% of the 237 million that reside in all European coastal areas.

Table 22 Comparison between Irish and European Coasts

	Unit	Irish Coast	European Coast
Total area (NUTS 3)	km ²	69,999	1,772,768
% Of EU coastal area	% Of EU coast	3.95%	100%
Length of coastline	km	7,711	184,659
<i>NUTS III Population Statistics (2016)</i>			
Population count	1000 persons	4,434	236,961
Population percentage	% Of EU coast	1.87%	100%

For descriptive purposes, this report uses Coastal EDs and available small area population statistics from the three most recent census of population to describe Ireland's coastal economy. Furthermore, the coastal ED classification is divided into rural and urban coastal EDs, resulting in 551 rural coastal EDs and 159 urban coastal EDs. The results can be seen in Table 23. Unsurprisingly, the urban EDs have a larger average population compared to the rural EDs (3.5 times larger on average). The urban coastal EDs population increased by 8% between 2011 and 2016, whereas the rural EDs only grew by a little over 1% in the same period. Total population growth across all coastal EDs was 2.8%.



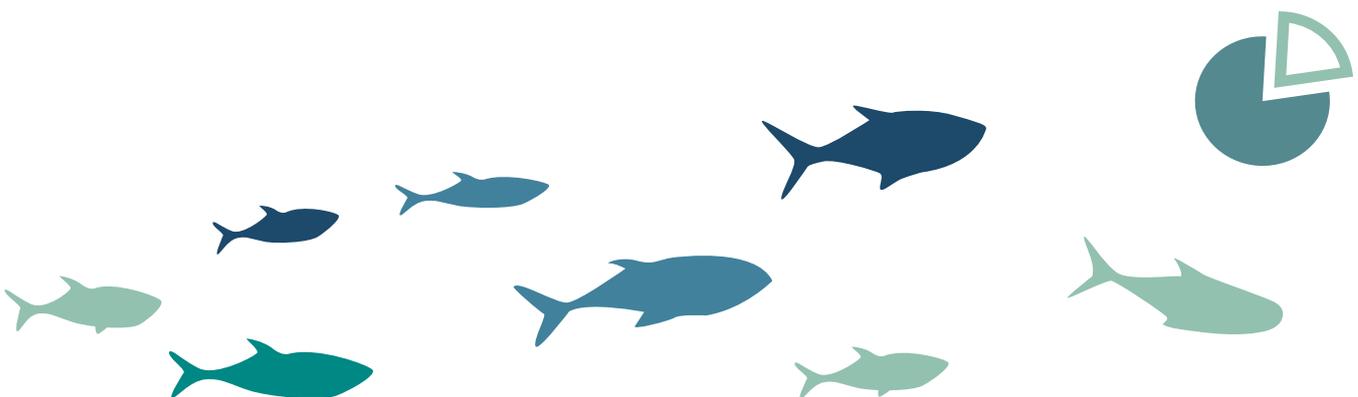
⁴³ Source: Eurostat



The length
of the Irish
coastline is
estimated
to be **7,711**
kilometres

Table 23 Comparison between urban and rural socioeconomic characteristics at the Coastal ED level

Coastal EDs – Rural and Urban Statistics			
Population	Coastal Rural EDs	Coastal Urban EDs	Total Coastal EDs
ED Population	1158.69	4174.25	1834.01
Population Change 11-16	1.23%	8.11%	2.77%
Unemployment			
Female Unemployment Rate	11.38	13.79	11.92
Female Unemployment Change 11-16 (Percentage Points)	-3.19	-3.12	-3.18
Male Unemployment Rate	14.24	16.73	14.80
Male Unemployment Change 11-16 (Percentage Points)	-0.33	-0.18	-0.30
Socio-economic Characteristics			
Third Level Education	31.10	43.29	33.83
Primary and Secondary Level Education	16.81	11.76	15.68
Semi- and Unskilled Manual Workers	18.84	18.23	18.70
Higher and Lower Professionals	35.30	36.53	35.57
Pobal Absolute Index Score	-5.83	-2.27	-5.04
Pobal Relative Index Score	-1.99	2.27	-1.04
Lone Parent Ratio	16.02	25.95	18.25
Age Deprivation Ratio	38.11	30.58	36.43



Coastal EDs have a slightly higher unemployment rate (13.44%) than the national average (12.07%). When comparing urban vs rural unemployment in Table 23 at the Coastal ED level, urban EDs have a higher average unemployment rate (15.16%) than rural EDs (12.95%). While both have seen reductions in the unemployment rate between 2011 and 2016, rural coastal areas saw a larger change than urban (-6.76 percentage points (pp) vs -5.42 pp). Male unemployment rates are higher than female unemployment in both urban (16.73% vs 13.79%) and rural (14.24% vs 11.38%) coastal EDs. However, female unemployment saw a larger relative change between 2011 and 2016, decreasing by an average of 3.12 pp in urban EDs and 3.19 pp in rural EDs. In comparison, male unemployment had an average reduction of 0.18pp in urban EDs and 0.33 pp in rural EDs. Figure 23 shows the distribution of male and female unemployment rates at the Coastal ED, County, and NUTS3 spatial scales.

Table 23 also shows the education characteristics at the Coastal ED level. Approximately 16% of the population in this coastal region have only a primary education. The proportion is marginally higher in coastal rural EDs (16.81%) and lower in coastal urban EDs (11.76%). Conjointly, rural coastal EDs have a lower proportion of people with a third level education (31.10%) when compared to urban coastal EDs (43.29%). Combined, 34% of all Coastal EDs residents have a third level qualification.

The proportion of semi- and unskilled labour to the total working population is similar between rural (18.23%) and urban (18.84%) areas and the overall coastal average (18.70%); likewise, the proportions of higher and lower professionals are very similar across the coastal rural EDs (35.30%), coastal urban EDs (36.53%), and overall coastal ED average (35.57%).

Rural EDs at this coastal level also have a lower ratio of single parents (16.02%) than that of the urban areas (25.95%), but have a higher age dependency ratio (38.11%) than urban EDs (30.58%).

Finally, we find that rural coastal EDs tend to have a lower average deprivation/affluence score than urban areas. This is based upon the Pobal Deprivation Index developed by Haase and Pratschke (2008⁴⁴), which derives a score from census data indicating quality of life in a particular region that ranges from -35 to +35. There are two deprivation indices: absolute and relative. The absolute index allows a direct comparison across the census years of 2006 (the base year), 2011, and 2016⁴⁵.

Under such scaling, rural EDs at the coastal level tended to be worse off than urban – rural EDs having an average Absolute Score of -5.83 and urban EDs having an average score of -2.27. As these are compared to a 2006 mean of zero, it would suggest that coastal areas in Ireland have still not returned to pre-recession affluence levels. Observing the Relative Index Scores, one finds that the average coastal ED has a score of -1.04, putting it “marginally below average” in terms of affluence. Under the relative scoring system, rural coastal areas are still, on average, in the negative with a score of -1.99, but urban coastal areas have a score of +2.27. The same socio-economic characteristics presented above are shown at all coastal spatial scales in table 24. The distribution of unemployment and the Relative Deprivation Index scores are shown for the different coastal spatial scales and for a select number of coastal cities in figures 24 and 25.

⁴⁴ Haase T, Pratschke J. (2008). *New Measures of Deprivation for the Republic of Ireland*. Dublin: Pobal.

⁴⁵ The relative index is particular to a given census wave and highlights deprivation differences at a relative scale across Ireland. Relative scores are scaled based on a normal distribution with a mean of 0 and standard deviation of 10. Any scores that fall within the first standard deviations (-10 to 0/ 0 to +10) are considered marginally below/above average, scores within the second standard deviation (-20 to -10/ +10 to +20) are considered disadvantaged/affluent, and scores within the third standard deviation (-30 to -20/ +20 to +30) are considered very disadvantaged/very affluent. Anything below -30 and above +30 is considered to be in a state of extreme disadvantage or affluence, respectively.

Table 24 Average socioeconomic characteristics of Irish coastal communities based on the 2016 Irish population census and Haase and Pratschke's Pobal Deprivation Index

Coastal Characteristics - EDs, Counties, & NUTS III				
Population	Coastal EDs	Coastal Counties	NUTS III	Ireland
ED Population	1834.01	1460.23	1457.31	1396.85
Population Change 11-16	2.77%	2.67%	2.52%	2.46%
Unemployment				
Female Unemployment Rate	11.92	10.77	10.84	10.92
Female Unemployment Change 11-16 (Percentage Points)	-3.18	-3.06	-3.00	-2.98
Male Unemployment Rate	14.80	13.22	13.09	13.06
Male Unemployment Change 11-16 (Percentage Points)	-0.30	-0.61	-0.75	-0.83
Socio-economic Characteristics				
Third Level Education	33.83	31.98	31.24	30.86
Primary Level Education Only	15.68	15.61	15.64	15.69
Semi- and Unskilled Manual Workers	18.70	18.29	18.27	18.25
Higher and Lower Professionals	35.57	35.80	35.53	35.48
Pobal Absolute Index Score	-5.04	-4.71	-4.92	-5.03
Pobal Relative Index Score	-1.04	-0.78	-1.00	0
Lone Parent Ratio	18.25	16.38	16.08	15.81
Age Deprivation Ratio	36.43	36.35	36.49	36.53

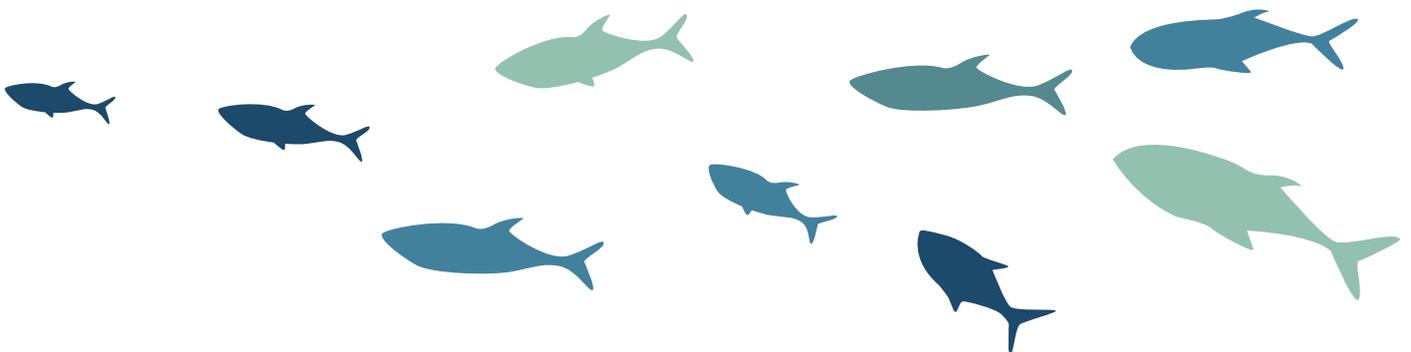


Figure 23 Male and Female Unemployment Rates at the Coastal ED, County, and NUTS3 spatial scales

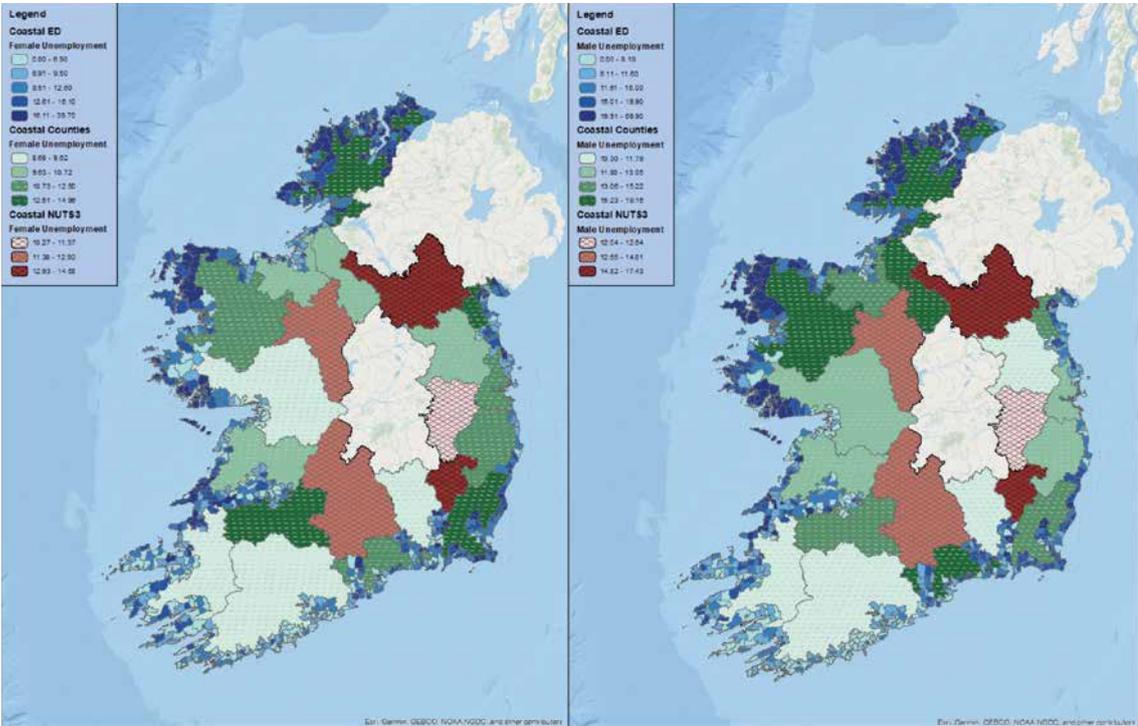
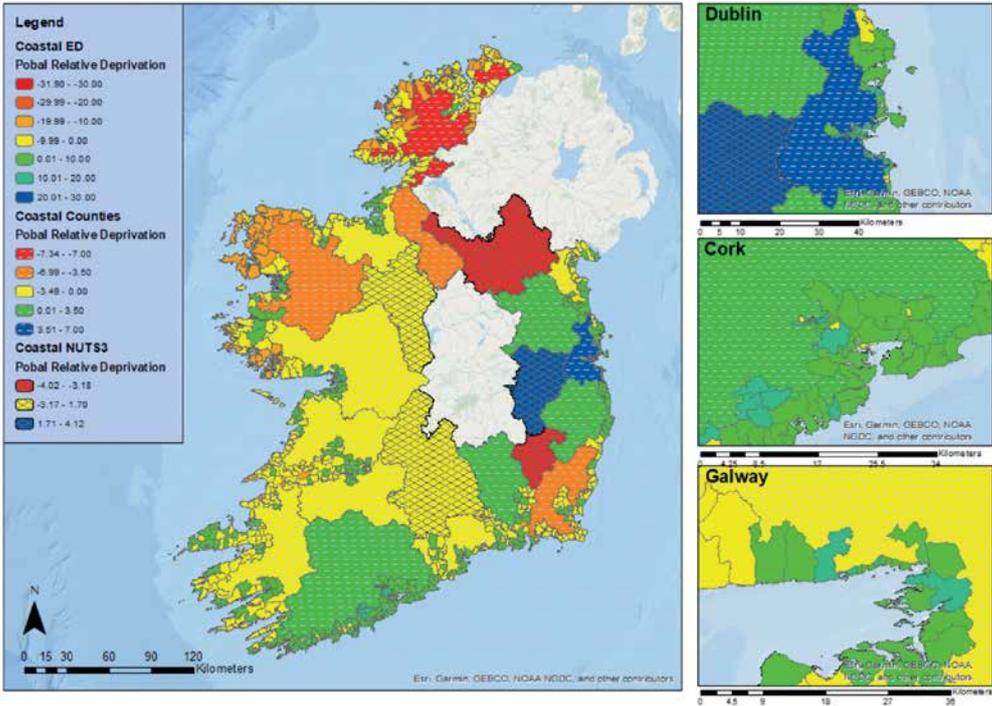


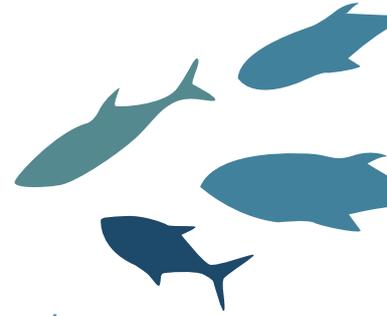
Figure 24 Pobal Deprivation Index scores at the Coastal ED, County, and NUTS3 spatial scales





Approximately
**40% of
Ireland's
population**
live within five
kilometres of
the coastline

Valuing Ireland's marine ecosystem services



The ocean industry statistics generated in this report provide a first order understanding of the economic importance of our seas by providing information on the industries using the seas around Ireland but the value of marine ecosystems goes beyond that of the output of these ocean economy industries. The economic contribution of the oceans is still undervalued if the value of the many other marine ecosystem services from which we benefit are not also considered. Marine ecosystems provide many services that benefit societies. These services are “provided by the processes, functions and structure of the marine environment that directly or indirectly contribute to societal welfare, health and economic activities”.

Harnessing Our Ocean Wealth – An Integrated Marine Plan (IMP) for Ireland highlighted as a key action the need for further research into generating “economic values of marine biodiversity and ecosystem services to ensure best practice planning and management of the ocean resource”. Economic valuation attempts to quantify the benefits to society from the provision of such services, and express these values in monetary units that can be compared with other sources of value to the general public. While the value of some of these goods such as fish and aquaculture produce are somewhat easier to measure, the value of many other benefits such as carbon absorption, waste treatment and recreation are not generally captured by prices in any established markets and require non-market valuation techniques to be employed. However, without incorporating these values into the decision making processes, these benefits may be ignored or underestimated and changes within coastal and marine zones could incur a net loss to Irish society.

With the research gap identified by the IMP in mind, a recent report by SEMRU⁴⁶ analysed the marine, coastal and estuarine ecosystem service benefits that society receives from Irish waters. It examined the provisioning, regulating, cultural and supporting services provided by the Irish marine environment. In particular, the study estimated the value of waste assimilation services, coastal defence services, carbon absorption services, recreational services, offshore and inshore capture fisheries, aquaculture and seaweed harvesting and the contribution proximity to the coast can make to the value of residential property.

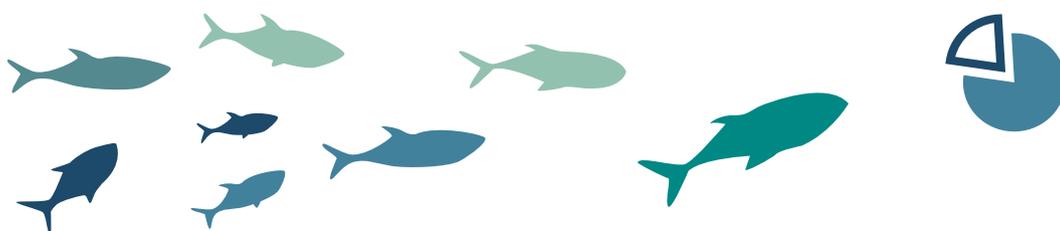
The report used a framework called the UN Common International Classification of Ecosystem Services (CICES). It has been endorsed as a tool for classification of ecosystem services by the United Nations and the European Commission. Even though not all of the ecosystem services provided by the marine environment can be monetarized, the report indicated that the value of those that can is substantial. The values generated by the report are reproduced in table 25.

The information put together on the marine ecosystem service benefits from Irish waters compliments the information generated on the Irish ocean economy industries⁴⁶ by providing policymakers with information about the value of market and non-market marine ecosystem services, and the potential costs if these services are lost. This information is needed to underpin the evidence-based policies that will safeguard Ireland's marine ecosystems and support the full implementation of Harnessing Our Ocean Wealth. The full report on valuing Ireland's marine ecosystem services can be downloaded at <http://www.epa.ie/pubs/reports/research/water/research239.html>.

⁴⁶ Norton, D., Hynes, S. and Boyd, J. (2018). EPA Research Report No 239: Valuing Ireland's Coastal, Marine and Estuarine Ecosystem Services, EPA Publications, Wexford.

Table 25. Values of Irish Coastal and Marine Ecosystem Service Benefits

Ecosystem Service	CICES Classification	Quantity of ES per annum	Estimate of the Value of ES per annum
<i>Provisioning ecosystem service</i>			
Off shore capture fisheries	<i>Wild Animals</i>	469,735 tonnes	€472,542,000
Inshore capture fisheries	<i>Wild Animals</i>	14,421 tonnes	€42,113,000
Aquaculture	<i>Animals - Aquaculture</i>	39,725 tonnes	€148,769,000
Algae/ Seaweed harvesting	<i>Wild Plants & Algae/ Plants & Algae from Aquaculture</i>	29,500 tonnes	€3,914,000
Genetic materials	<i>Genetic materials from biota</i>	Not quantified	Not valued
Water for non-drinking purposes	<i>Surface water for non-drinking purposes</i>	1,189,493,326 m ³ of seawater used for cooling	Not valued
<i>Regulating and maintenance ecosystem services</i>			
Waste services	Mediation of waste, toxics and other nuisances	9,350,642 kg organic waste 6,834,783 kg nitrogen 1,118,739 kg phosphorous	€316,767,000
Coastal defence	Mediation of flows	179km of coastline protected by saltmarsh	€11,500,000
Lifecycle and habitat services	Lifecycle maintenance, habitat and gene pool protection	773,333 ha protected through SAC's	Not valued
Pest and disease control	Pest and disease control	Not quantified	Not valued
Climate regulation	Atmospheric composition and climate regulation	42,647,000 tonnes CO ₂ absorbed	€818,700,000
<i>Cultural services</i>			
Recreational services	<i>Physical and experiential interactions</i>	96 million marine recreation trips per year	€1,683,590,000
Scientific and educational services	<i>Scientific & educational</i>	Marine education and training fees	€11,500,000
Marine heritage, culture and entertainment	<i>Heritage, cultural and entertainment</i>	Not quantified	Not valued
Aesthetic services	<i>Aesthetic</i>	Flow value of coastal location of housing	€68,000,000
Spiritual and emblematic values	<i>Spiritual and/or emblematic</i>	Not quantified	Not valued
Non-use values	<i>Existence & bequest values</i>	Not quantified	Not valued





Climate regulation
(includes climate change mitigation measures such as carbon sequestration)

Genetic materials

Marine tourism
(including cruise ships)

Aesthetic services

Scientific and educational services

Recreational services

Waste treatment
(i.e. wastewater treatment)

Seafood processing

Oil and gas extraction

Water for non-drinking purposes
(i.e. cooling for power plants)

Coastal defence
(storm & flood protection)

Aquaculture (fish and shellfish based systems)

Shipping and maritime transport

Capture fisheries
(including capture shellfish)

Marine renewable energy
(including offshore wind, wave and tidal devices)

Lifecycle and habitat services
(nursery grounds/
marine protected areas)

Existence & bequest values

Spiritual and emblematic values

Marine heritage, culture and entertainment

Pest & disease control
(includes management of invasive species)

Seaweed & shellfish harvesting

Seabed mining

Provisioning Ecosystem Services

Regulating and Maintenance Ecosystem Services

Cultural Ecosystem Services

Supporting Ecosystem Services

Other Marine Services

Conclusions

As recently noted by the Commissioner for Environment, Maritime Affairs and Fisheries, Karmenu Vella “One condition, among others, for enabling successful blue growth is the availability of better data, analysis and knowledge about the sea and the use we make of it”⁴⁷. With this in mind this report has endeavoured to provide policy makers and other interested stakeholders with a profile of Ireland’s ocean economy and sector-by-sector economic projections against which future marine socio-economic data can be compared.

The figures generated in this report also provide useful information to support Ireland’s implementation of the EU Marine Strategy Framework Directive (MSFD) and the Maritime Spatial Planning (MSP) Directive as well as providing an indication as to how government policy may be impacting on the achievement of the Harnessing our Ocean Wealth targets.

The Organisation for Economic Development expect the global ocean economy to grow rapidly in the coming years. By 2030 they estimate that the ocean economy will provide 40 million jobs and double its contribution to global GDP⁴⁸. Based on the figures presented in this and previous reports it can be seen that Ireland continues to make a significant contribution to this global growth. Ireland’s ocean economy is also steadily moving towards its own 2030 target, as set out in the Integrated Marine Plan for Ireland - Harnessing Our Ocean Wealth (HOOW) (2012), that being to double the value of Ireland’s ocean wealth to 2.4% of GDP. In 2007 the ocean economy was estimated to have contributed 1.2% to GDP; that figure in 2018 now stands at 2%. The second key economic target set out in the Marine Plan was to increase the turnover from Ireland’s ocean economy to exceed €6.4bn by 2020. Based on the estimates for 2018 it can be seen that Ireland is also moving steadily towards this target; turnover increased by 13% over the period 2016 to 2018 to an estimated €6.23 billion.

As set out in HOOW, “managing our ocean wealth requires an overarching national marine ‘spatial’ plan underpinned by an efficient and robust planning and licensing framework”. Since the launch of HOOW the EU Maritime Spatial Planning Directive was adopted in 2014. It established an EU-wide framework for maritime spatial planning (MSP). The Department of Housing, Planning and Local Government is currently leading the preparation of a National Marine Spatial Plan for Ireland to cover a 20 year period⁴⁹. The data generated in this report will inform the national level plan. As the maritime spatial planning process matures more regional specific plans will be developed. This will require a more nuanced understanding of the economic contribution of the ocean economy at a more refined spatial scale. This remains a gap in our knowledge for a number of the industries where currently only national level data is available. Integrating the ocean economic data with information/ models of changes in the marine environment is also an area requiring further research in order to deliver an effective maritime spatial plan and to ensure that the sustainable element of blue growth is front and central in marine policy development.

⁴⁷ European Commission (2019). The EU Blue Economy Report. 2019. Publications Office of the European Union. Luxembourg.

⁴⁸ OECD (2016). The Ocean Economy in 2030, OECD Publishing Paris.

⁴⁹ Department of Housing, Planning and Local Government (2018). National Marine Planning Framework Baseline Report, Government of Ireland Publication.

The Irish ocean economy continues to face a number of challenges in the coming years. One key concern is the fact that Brexit uncertainty continues to loom over the sector. While the draft withdrawal agreement does point toward the establishment of a new fisheries agreement on access to waters and quota sharing, the passing of the agreement by the British parliament is still by no means certain. Whether it is a 'hard' or 'soft' Brexit, Irish ports will also have to adapt to new customs requirements. Adaption plans are already being put in place by Irish ports and new direct trade routes have being established between Ireland and continental Europe. Any delays in movement through ports could also have a serious effect on the seafood industry where the timely delivery of fresh produce is vital.

Marine environmental concerns are another big challenge facing the sector. Climate change, sea level rises, marine plastic pollution and the health of marine ecosystems are now issues of major concern, not just for the science community but for the general public as well. Initiatives such as the voluntary BIM's Fishing for Litter programme show that the ocean economy industries are serious about meeting these challenges. The governments Climate Action and Low Carbon Development Bill will also require changes by the sector but will also offer opportunities for blue growth as demand for more renewable energy and ecosystem based solutions to climate adaption in coastal areas grow. As reported here, the Irish ocean economy has seen significant growth in recent years and major challenges aside, in general the outlook for further growth remains positive.



Appendix



Methodology and Data Sources

Methodology

DEFINITIONS OF MARINE-BASED INDUSTRIES WITHIN THE OCEAN ECONOMY DIFFER ACROSS COUNTRIES. THE GENERAL APPROACH TAKEN IN THIS REPORT IS TO:

1. Revise and update the industries from previous reports that are part of the ocean economy
2. Identify the marine industries for which there is publically available data
3. Estimate the proportion of economic activity that is marine-based using proxies
4. Record levels of turnover, employment and gross value-added for each industry that is in the ocean economy
5. Identify industries where alternative data collection methods must be developed, i.e. surveys.

Certain industries are clearly identifiable as fully marine, for example shipping and maritime transport or sea fisheries. Data on other marine activity can be more difficult to obtain; for example, marine engineering data cannot be differentiated from general engineering using the data collected by the Central Statistics Office (CSO). Therefore, these industries require additional work (surveys/proxies) to ensure that they are represented in the ocean economy.

The general approach adopted in this report for assessing Ireland's ocean economy has been concerned with production activity: net output/turnover, input, gross value added, and employment. The Business Demography (BD) and Structural Business Statistics (SBS) Division in the CSO provides data on turnover, GVA, employment, and where available, exports for each sector within the Irish economy. The data are collected across a number of censuses and surveys. The CSO census and surveys used for the collation of the data on Ireland's ocean economy include;

- The Census of Industrial Production (CIP)
- The Annual Services Inquiry (ASI)
- Building and Construction Inquiry (BCI)
- Business Register
- Intrastat

The data relating to marine activity from these censuses and surveys is provided at the NACE four-digit level. The NACE code system is a pan-European classification system that groups enterprises according to their business activities by assigning a unique 2, 3 and 4 digit code to each industry. Where data are not available from CSO sources, a survey developed by SEMRU – the SEMRU Marine Enterprise Survey - is conducted for particular marine sectors. The companies surveyed are compiled using a wide range of database sources, including the Marine Institutes company database. For a number of companies, Company Registration Office (CRO) financial data was also used.

Methodology by Sector

The reference year for this report is 2016. This is the most recent year that data is available currently from the CSO for the above mentioned surveys. In the case of fishing and aquaculture, figures for 2017 and 2018 were also available from BIM as were cruise liner information from the IMDO. Estimates based on economic projections for the performance of the other ocean economy industries in 2017 and 2018 are also presented in this report. These estimates are the result of a forecasting exercise of the future turnover, GVA and employment in Ireland's ocean economy on a sector-by-sector basis. This methodology is based on published socio-economic data from the CSO, government economic forecasts and information obtained from interviews with marine-related enterprises and relevant government departments and agencies.

Shipping & Maritime Transport

Shipping and maritime transport is one of the marine industries that can be directly identified in the standard NACE classification. The data for the Shipping and Maritime Transport industry is obtained entirely from the CSO (ASI). The NACE codes include some activities that are not fully marine such as 'Other transportation support activities' (NACE Rev (2) 52.29) and Cargo Handling (NACE Rev (2) 52.24). Proxies are used to account for the percentage of relevant maritime activity, i.e. trade by sea.

Economic projections for turnover and GVA in 2017 and 2018 are based on the performance of the shipping and maritime transport industry reported by the Irish Maritime Development Office (IMDO) in their IShip index (Irish Maritime Transport Economist, 2019). Estimates for employment are obtained from the annual growth rate reported by the CSO in their Quarterly National Household Survey (Transport and storage).

Tourism and leisure in marine and coastal areas

The tourism and leisure in marine and coastal areas industry is made up of seven NACE codes as follows: 5510 - Hotels and similar accommodation, 5520 - Holiday and other short stay accommodation, 5530 - Camping grounds, recreational vehicle parks and trailer parks, 9312 - Activities of sports clubs, 9319 - Other sports activities, 9321 - Activities of amusement parks and theme parks, 9329 - Other amusement and recreation activities. Each of these codes will only be partly marine or coastal related as tourism can obviously be unconnected with marine activities or may not even occur in coastal areas.

Based on the Fáilte Ireland Accommodation Occupancy Survey, it is possible to calculate the number of bed nights in Fáilte Ireland Registered/Approved hotels, guesthouses, B&Bs, self-catering accommodation, hostels and Caravan/Camping grounds. This bed night information is broken down between coastal and non-coastal areas where coastal is defined as municipalities (LAU-2) that either border on the sea or have 50% of their surface within a distance of 10 km from the sea. The share of 'Immediate urbanised & Coastal' and 'Thinly populated & Coastal' bed nights out of total bed nights indicates that 27% of all visitor bed nights are spent in coastal areas. The category 'Densely populated & Coastal' is not included in the calculation of coastal bed nights as this generally reflects visits to Ireland's larger coastal cities which in the majority of cases are not in any way marine related whereas visitors to areas outside of cities do so in order to get close to the natural environment. We

therefore take 26% of the total value for turnover, GVA and employment from the accommodation NACE categories' 5510, 5520 and 5530, as a fair estimate of the contribution from tourism in marine and coastal areas.

Based on the share of marine related leisure enterprises (information on marine enterprise numbers comes from the Initial Assessment for the Marine Strategy Framework Directive Assessment for Ireland) in the total number of enterprises recorded for the leisure sector NACE categories (9312, 9319, 9321, 9329) from the CSO Business Registry we estimate a 9.8% share of marine enterprises across the leisure sector industries. We therefore take 10% of the total value for turnover, GVA and employment from these NACE categories as a fair estimate of the contribution from marine leisure activities.

Adding the estimates for the tourism in marine and coastal areas based on the share of bed nights described above and the estimate of the contribution from marine leisure based on share of marine leisure enterprises provides the total values for turnover, GVA and employment for the sector tourism and leisure in marine and coastal areas.

Economic projections for turnover and GVA in 2017 and 2018 are based on estimates provided by Fáilte Ireland and the CSO in terms of international and domestic tourism numbers. Estimates for employment are obtained from the annual growth rate reported by the CSO in their Quarterly National Household Survey (Accommodation and food service activities).

International Cruise Industry

International cruise data differs from other sectors as it captures passenger expenditure rather than cruise ship turnover. For this report, cruise data on the total number of passengers was provided by the Irish Maritime Development Office (IMDO) for all years up to and including 2018. This information was used in conjunction with the average expenditure by port by disembarking passenger previously reported by Fáilte Ireland. Expenditure levels are adjusted for inflation accordingly.

Marine Retail Services

An online survey was designed by SEMRU and administered to the companies conducting boat sales, chandlery services and marine equipment engineering in March/April 2018. Additional data for seafood retail establishments is obtained from the CSO – Annual Services Inquiry.

Economic projections for turnover and GVA in 2017 and 2018 are based on reported data from the Retail Sales Inquiry, published by the CSO. Estimates for employment are obtained from the annual growth rate reported by the CSO in their Quarterly National Household Survey (Wholesale and retail trade).

Sea Fisheries

Figures for turnover, GVA and employment are provided by BIM and the EU Scientific, Technical and Economic Committee for Fisheries..

Marine Aquaculture

Figures for turnover, GVA and employment are provided by BIM. Economic projections for GVA in 2018 are obtained from the annual growth rate reported by BIM (Aquaculture survey)/STECF in the 2008-2018 period.

Seafood Processing

Seafood Processing can be directly identified in the standard NACE classification provided by the CSO. The data was collected under the NACE code 10.20 'Seafood Processing' from the Census of Industrial Production (CIP).

Economic projections for GVA in 2017 and 2018 are estimated as a function of the level of seafood exports reported by Bord Bia in those years. Turnover and employment figures for 2017 and 2018 are provided by BIM.

Oil & Gas exploration and production

Oil & Gas can be directly identified in the standard NACE classification. The data for the Oil & Gas sector was obtained in part from the CSO, CIP - NACE 06.10, 06.20, 09.10. The data is confidential for some codes in certain years due to the small number of companies operating under the three Oil & Gas NACE codes. As a result, a survey was administered to the sector to complement the CSO data and to include oil and gas exploration activities.

Economic projections for turnover and GVA in 2017 and 2018 are estimated on the basis of historic trends in the sector and growth rates in exploration licenses, licensing options and seismic acquisitions, as well as the number of wells spudded and drilled offshore. Shareholder annual financial information from the newly operational Corrib Gas field was used to estimate turnover, GVA and employment in 2018.

Marine Manufacturing, Engineering & Construction

The marine manufacturing sector data was collected primarily from the Census of Industrial Production and the Building and Construction Inquiry, CSO. The data reported also include marine engineering activities. A survey was also administered to marine engineering companies in March/April 2019, as it is not possible to identify specifically marine engineering in the main engineering NACE codes.

Economic projections for turnover, GVA and employment in 2017 and 2018 are estimated on the basis of historic trends in the sector as measured by SEMRU previous surveys and overall trends in general manufacturing from the CSO.

Advanced Marine Technology Products and Services

An online survey was designed by SEMRU and was administered to relevant companies in March/April 2019.

Marine Commerce

An online survey was designed by SEMRU and was administered to relevant companies in March/April 2019.

Biotechnology – Seaweed

An online survey was designed by SEMRU and was administered to relevant companies in March/April 2019.

Marine Renewable Energy

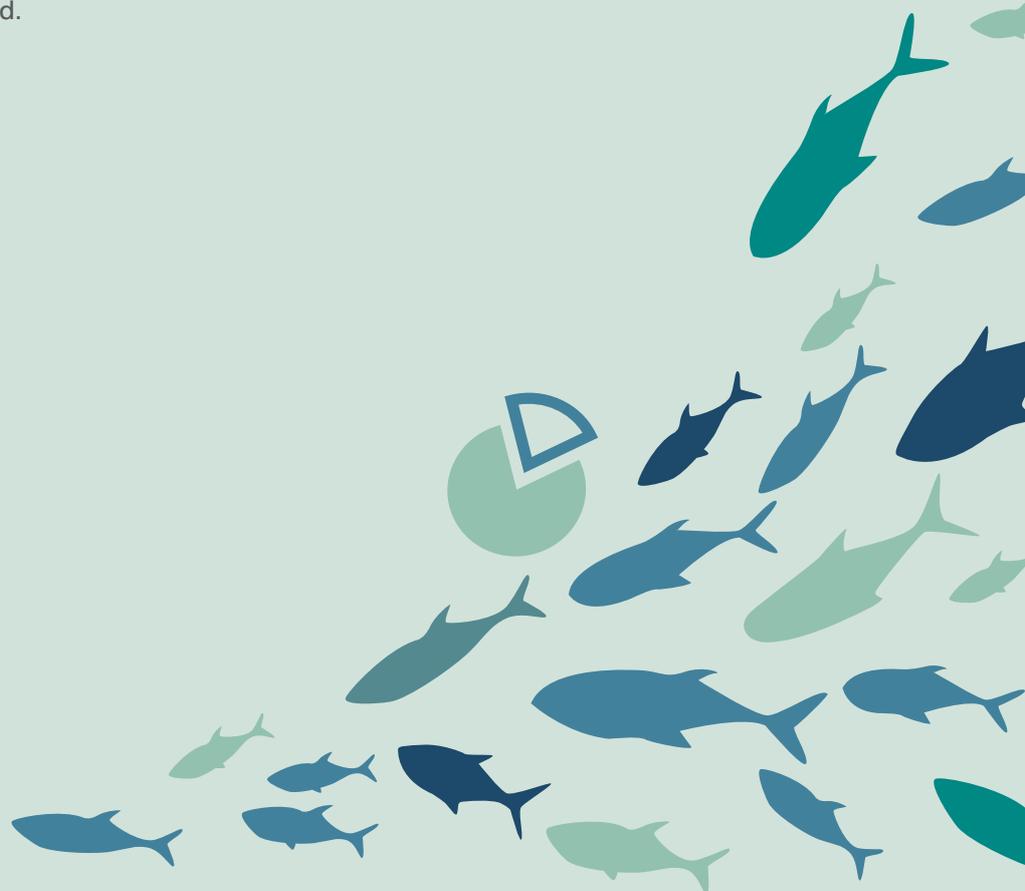
An online survey was designed by SEMRU and was administered to relevant companies in March/April 2019.

A Note on the EU Blue Economy Report 2019

The European Commission recently published their second European ocean economy report⁵⁰. This series provides an overview of the size of the ocean economy in the European Union. It provides details on GVA and employment across a number of industries by member state, including Ireland. It should be noted however that there are a number of key differences between the figures generated in the EU report for Ireland's ocean economy compared to those generated here.

Firstly, since their first ocean economy report, SEMRU have always provided estimates of turnover and GVA at basic prices. The EU report calculates the same indicators at factor cost. Secondly, the definitions used for a number of the industries varies across both reports as does the data sources used. For example, the EU's definition for marine and coastal tourism is much broader than the one used by SEMRU and results in an estimate for marine and coastal tourism that is a multiple of that produced here. Finally, the SEMRU ocean economy report has a broader coverage in terms of the number of industries compared to that of the EU report. This is mainly due to the fact that SEMRU conduct additional surveys for the emerging industries in order to estimate economic activity and employment numbers.

These differences aside both the EU and SEMRU reports demonstrate a very similar pattern of development of Ireland's ocean economy over the last decade. While more limited in coverage, the EU report is also extremely useful when comparing performance in the ocean economies across Europe and in line with the finding in this SEMRU report the most recent figures from the EU points to the fact that the largest expansion in ocean economy activity across the EU between 2009 and 2017 was observed in Ireland.



⁵⁰ European Commission (2019). The EU Blue Economy Report. 2019. Publications Office of the European Union. Luxembourg.

Data Sources

Shipping and Maritime Transportation Logistics

- Annual Services Inquiry 2008 - 2016, CSO
- IShip Index 2008-2018, IMDO
- Quarterly National Household Survey (Transport and storage) 2015; 2016, CSO

Tourism and leisure in marine and coastal areas

- Domestic and overseas visitors 2017-2018, Fáilte Ireland
- Quarterly National Household Survey (Accommodation and food service activities) 2017; 2018, CSO

Sea Fisheries

- The Business of Seafood 2018, BIM

Aquaculture

- The Business of Seafood 2018, BIM

Seafood Processing

- Census of Industrial Production 2008 - 2016, CSO
- Seafood exports 2017; 2018, Bord Bia
- The Business of Seafood 2018, BIM

International Cruise

- Irish Maritime Transport Economist 2012 to 2018, IMDO
- Maritime Statistics, CSO

Oil and Gas Activity

- Census of Industrial Production 2008 - 2016, CSO
- SEMRU company survey



Renewable Energy

- SEMRU Company Survey

Water Construction

- Buildings and Construction Inquiry 2008 - 2016, CSO

Marine Engineering

- SEMRU Company Survey
- Quarterly National Household Survey (Industry) 2015; 2016, CSO
- Industrial Turnover Index 2016, CSO

Boat Building

- Census of Industrial Production 2008 – 2016, CSO
- Industrial Turnover Index 2016, CSO

High Tech Marine Services

- SEMRU Company Survey

Marine Commerce

- SEMRU Company Survey

Marine Retail Services

- SEMRU Company Survey
- Annual Survey Inquiry 2008 - 2016, CSO
- Quarterly National Household Survey (Wholesale and retail trade) 2015; 2016, CSO
- Retail Sales Inquiry 2016, CSO

Marine Biotechnology & Bio-products

- SEMRU Company Survey



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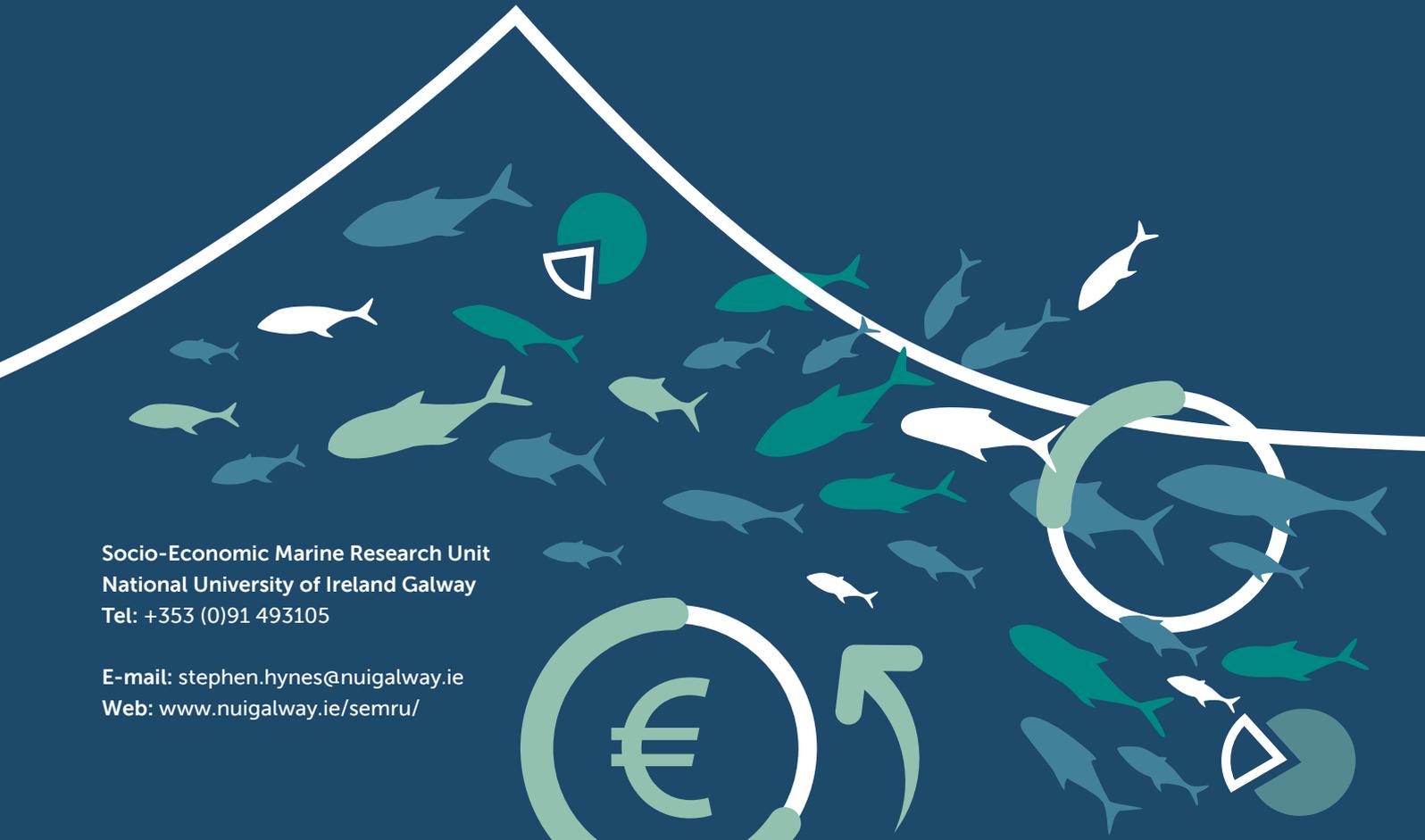
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Glossary of Acronyms/Terms

ASI	The Annual Services Inquiry
BCI	Building and Construction Inquiry
BIM	Bord Iascaigh Mhara
CFP	Common Fisheries Policy
CIP	Census of Industrial Production
CRO	Company Registration Office
CSO	Central Statistics Office
EDs	Electoral Districts
FI	Fáilte Ireland
FTEs	Full Time Equivalents
GDP	Gross Domestic Product
GVA	Gross Value Added
HOOW	Harnessing Our Ocean Wealth
ICT	Information & Communication Technology
IMDO	Irish Maritime Development Office
IMP	Integrated Marine Plan
LAU	Local Administrative Unit
MSFD	Marine Strategy Framework Directive
MSP	Maritime Spatial Planning
NACE	Statistical classification of economic activities in the European Community
PAD	Petroleum Affairs Division
R&D	Research and Development
REV 2	Revision 2 of the NACE code system (post 2007)
RSS	Responsibly Sourced Seafood
SBS	Structural Business Statistics
SEMURU	Socio Economic Marine Research Unit
SME	Small or Medium Sized Enterprises
STECF	Scientific, Technical and Economic Committee for Fisheries







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