Ireland's Ocean Economy

December 2010

NUI Galway
OÉ Gaillimh

SEMRU
Socio-Economic Marine Research Unit

This SEMRU report has been prepared by:

Karyn Morrissey
Stephen Hynes
Michael Cuddy
Cathal O'Donoghue

For further information please contact:

Dr. Karyn Morrissey
SEMRU (Socio-Economic Marine Research Unit),
J.E. Cairnes School of Business and Economics,
National University of Ireland, Galway.
Office: +353 (0)91 495325
Fax: +353 (0)91 524130
email: karyn.morrissey@nuigalway.ie
web:http://www.nuigalway.ie/semru/

Acknowledgements

The report team would also like to thank, Kevin Phelan, Viacheslav Varonovich, Brid Fitzpatrick, Michael Brennan (CSO), Geoffrey O'Sullivan, Michael O'Toole, Veronica Cunningham, Rebecca Corless, Jenny O'Leary, Aengus Pearson, Yvonne Shields, Felicity Donnelly, Peter Heffernan , Trevor Alcorn, Dermot Hurst (Marine Institute), Mairtin Walsh (BIM), Richie Flynn (IFA), Glenn Murphy, Rory McGuire, Victoria Vogel (IMDO), Anne Kinsella (REDP, Teagasc), John Conroy (IOAA), Nick O'Neill (SLR Consulting), Eoin Sweeney (SEAI), Seamus McCabe, Garrett Connell (NOW Ireland), Peter Coyle (MRIA), Brendan Keating, Carmel Dineen (Port of Cork).

Finally, we would like to thank all the companies who gave their time to filling out the survey. We appreciate both your time and interest in the report.

This work was funded through the Beaufort Marine Research Award, which is carried out under the Sea Change Strategy and the Strategy for Science Technology and Innovation (2006-2013), with the support of the Marine Institute, funded under the Marine Research Sub-Programme of the National Development Plan 2007–2013.

NUI Galway
OÉ Gaillimh

NDP
National Development Plan 2007 - 2013

Marine Institute
Foras na Mara

SeaChange
Casadh na Taoide

SSTI
Strategy for Science, Technology and Innovation

teagasc
Agriculture and Food Development Authority

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Executive Summary

In 2007, the reference year for this report, the direct economic value of the Irish ocean economy was €1.44 billion or approximately 1% of GDP. The combined direct and indirect value of the sector was €2.4 billion. The sector had a turnover of €3.4 billion, and provided employment for approximately 17,000 individuals. Compared to figures re-calculated for the previous reference year (2003), 2007 saw a 34% increase in turnover, a 6.5% rise in employment and a 40% rise in direct gross value added (GVA). However, it must be remembered that this period (2003-2007) was at the height of the Celtic Tiger years with significant increased activity particularly in the shipping, maritime transport and water-based tourism and leisure sectors.

The Irish Ocean Economy (2007)	
Direct GVA:	€1.44 billion
%GDP	1% GDP
Turnover:	€3.4 billion
Direct and indirect GVA:	€2.4 billion
Employment:	17,000 FTE

The ability of a maritime nation to identify its marine resources, to quantify their economic value and represent this as a percentage of national GDP, is critical if these resources are to be realistically included in national development planning. This was one of the major gaps identified in a suite of Foresight Studies undertaken in 2005 by the Marine Institute to inform the Sea Change Strategy published in 2006. To address this particular gap, grant-aid was provided under the Beaufort Award Scheme (National Development Plan) to establish the Socio-Economic Marine Research Unit (SEMRU) at the National University of Ireland, Galway. SEMRU, drawing, in particular, on expertise from NUI, Galway and Teagasc, now provides a focal point for socio-economic research related to the Irish ocean and coastal economies.

The specific targets in preparing this Report 'Ireland's Ocean Economy 2007' and core tasks for SEMRU in this context were to:

- Develop an appropriate methodology to collect reliable and comparable data on the various sub-sectors of Ireland's ocean economy, building on preliminary work published in 2005 by the Marine Institute;
- Provide a profile of Ireland's ocean economy for a baseline year (2007) against which future changes and trends could be measured and analysed.

The publication of Ireland's Ocean Economy 2007 represents the successful achievement of both of these objectives. In providing a methodology for data collection and a baseline reference year we now have the tools to more accurately measure trends, to assess the impacts and returns on investments in the sector and the ability to model different development scenarios.

The Ocean Economy: For the purpose of this report, the **ocean economy** is defined as *including any economic activity which directly or indirectly uses the sea as an input.* The **coastal economy**, on the other hand, represents all economic activity which takes place in the coastal region, for example, agriculture, which is not part of the ocean economy.

This report provides an invaluable profile of:

- **Established Ocean Industries** representing 94% of turnover in 2007 and including shipping & maritime transport, water-based tourism and leisure, seafood processing, fisheries, aquaculture, marine manufacturing, marine services and oil and gas;
- **New & Emerging Ocean Industries** (currently representing: 5% of turnover; 4% of employment; 6% of direct GVA) such as Renewable Ocean Energy, Marine Commerce, High-Tech Services and Marine Biotechnology and which, according to global market forecasts, have very significant potential to contribute to tomorrow's ocean and coastal economies.

The report also provides valuable and quantifiable insights into the role of the ocean economy in regional and rural development, providing county by county data on turnover and employment related to the ocean economy.

While it is not a function of this report to identify or comment on trends, it is inescapable that the baseline year (2007) was at the peak of the economic cycle (1995-2007). Thereafter, the Irish economy underwent a dramatic reversal with a GDP contraction of 14% and unemployment levels at 13% by 2010.

On a more positive note, the Irish ocean economy has a strong if small base and sectors such as shipping and maritime transport and tourism should rise as the global economy rises. Growth in the seafood sector will depend on reforms of the Common Fisheries Policy and our ability to use research and innovation to add value to the available resource base, improve competitiveness, reduce costs and introduce new value added products. Significant potential lies in local and international markets in the medium to long term in sectors concentrating on new and emerging technologies – Information & Communications Technology (ICT), Life Sciences, etc – areas where Ireland has an established an international reputation and research capacity. The four emerging markets identified: Renewable Ocean Energy, High-Tech Services, Blue Biotechnology and Marine Commerce are seen as having very significant potential and are the subject of positive government action.

Photography: David Branigan

1. Introduction

Ireland's marine resources, including extensive ocean and coastal territories and jurisdiction over a continental shelf nine times its landmass, are often overlooked in relation to the debate on economic development. The many opportunities and challenges associated with the use of marine resources requires long-term planning and investment if returns are to be realised in a sustainable way. It is therefore vital that the economic exploitation of these valuable resources be regularly analysed. The first phase of quantifying the size of Ireland's ocean economy was begun with the publication by the Marine Institute in 2005 of "Ireland's Ocean Economy and Resources". That initial briefing document provided a profile of Ireland's ocean economy in 2003, and explained why, and how, Ireland should seek to develop its marine resources. This report builds on this previous work by examining the state of the Irish ocean economy in 2007 and demonstrates how it has changed in the intervening period.

The methodology used in the current analysis has been refined since the 2005 report. Therefore to allow for comparability across the reports we have recalculated some of the estimates from the 2005 report using the current methodology and this comparison across years is shown in section 3. The ocean economy's definition and scope does however remain unchanged with respect to the previous publication, with the exception of marine commerce and water construction (the development and construction of harbour works, marinas, etc) which were not taken into account previously due to insufficient information. Also, in order to compare the figures for 2003, from the previous report, and the current year of analysis, 2007, it was necessary to revise estimations from the earlier report with more up to date information on some of the categories of activity that has become available in the intervening period.

The compilation of information in relation to the Irish ocean economy is important when one considers the recommendations of the European Council and Parliament concerning the implementation of marine spatial planning, the requirements of the Integrated Maritime Policy (IMP) for the European Union and the EU Marine Framework Strategy Directive (MSFD). The IMP seeks to make the collection and use of marine economic and scientific data easier and less costly and to foster compatibility in collection of such data across member states. The analysis in this report has been conducted in such a manner as to be comparable with similar reports in countries such as Britain and France. Meanwhile Article 8.1 (c) of the EU MSFD calls for an economic and social analysis of the use of all European waters by member states and of the cost of degradation of the marine environment. This report goes some way towards the characterisation of the use of Irish coastal and offshore natural resources as required under the MSFD.

In February 2007, the government adopted Sea Change: A Marine Knowledge Research and Innovation Strategy for Ireland 2007-2013[1]. One of the priority objectives of this strategy, to be achieved by 2013, is ensuring "the availability of high quality socio-economic data for all marine sectors through collaboration with the relevant data collection agencies". Also, part of Sea Change's vision for 2020 is that there will be a much greater national awareness of both the market and non-market value of the marine resource leading to an enhanced understanding of the overall contribution and potential that marine resources can make to Irish regional, social and economic development. This report has collected that data and put a methodology in place for future marine economic data collection and analysis to ensure this objective is achieved.

Due to issues of data availability, the reference year of this report was necessarily taken as 2007. This is also the year of adoption by the Irish Government of the Sea Change Strategy and the information gathered will therefore act as a baseline in monitoring the success of that strategy's implementation. The year 2007 pre-dates the downturn in the economic fortunes of the State and therefore does not reflect the fall in activity (particularly shipping and marine manufacturing) which has been experienced since then, similar to other economic sectors in the country. As such the report represents a snap shot of the Irish ocean economy at probably the peak of the economic cycle.

[1]For further information on the aims and objectives of this strategy see "Marine Institute (2006). Sea Change: A Marine Knowledge, Research and Innovation Strategy for Ireland 2007-2013 Part 1 & 2, Marine Institute Publication, Renville, Oranmore.
http://www.marine.ie/home/publicationsdata/publications/SeaChangeStrategyandForesightPublications.htm

Photography: Fiona Watson

2. Ireland's Marine and Coastal Resources

Ireland – A Marine Nation

The ability to exploit ocean resources in order to create jobs or add value to local economies is often overlooked in relation to the debate on economic development in Ireland. The lack of recognition that Ireland has sovereign rights over 900,000km2 of seabed (which is an area 10 times the size of the land area of Ireland) has meant lost opportunities in terms of the development of both the national economy and rural coastal communities. As the country looks for new opportunities in the current difficult economic circumstances, Ireland's marine resources offer a substantial opportunity to develop a previously under-exploited asset base.

In Ireland, shipping, water-based tourism and leisure and seafood are the most important categories of economic activity in the marine sector. Sea-based transport accounts for over 99% of the total volume and approximately 95% of the value of goods traded by the Irish economy. In terms of fishing, there are approximately 2,000 vessels in the Irish fishing fleet which represents approximately 2% of the total European fishing fleet capacity and according to EU figures[2], Ireland has the 7th largest aquaculture sector in the EU and produced 48,350 tons of aquaculture in 2007.

The use of the sea as a renewable energy source is also of growing importance especially considering the EU target of cutting CO2emissions by 20% by the year 2020 and the equally ambitious Government targets of generating 40% of electricity from renewables by 2020.

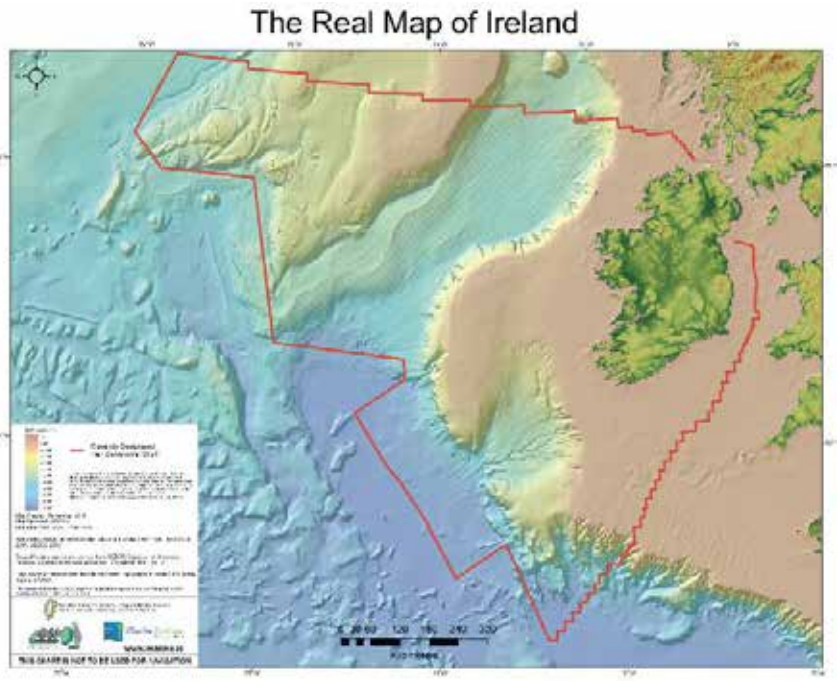

Figure 2.1:The Real Map of Ireland

High profile projects such as the national marine mapping project INFOMAR have added to the general awareness of the natural marine resources available to Ireland and have enabled the identification of new areas of potential. This and other projects funded under the Marine Institute's Sea Change Strategy are facilitating strategic coastal and off-shore developments in renewable energy, environmental protection and related technology opportunities, exploring the use of marine resources for drugs, medical devices and food ingredients, improvements in the seafood sector including new product development and targeting of new markets, increasing our understanding of Climate Change and improving the safety of maritime transport.

[2] http://ec.europa.eu/maritimeaffairs/pdf/country_factsheets/ireland_en.pdf
http://www.marine.ie/home/publicationsdata/publications/SeaChangeStrategyandForesightPublications.htm

Ireland's Ocean and Coastal Economies

This report differentiates between the ocean and coastal economies. The **ocean economy** can be defined as the economic activity, which directly or indirectly uses the sea as an input, whereas the **coastal economy** represents all economic activity which takes place in a specified coastal region; the sum of all sectoral (e.g. fishing, agriculture, etc) incomes in the region.

The coastal economy can have both direct and indirect impacts on the ocean economy. Commercial activities in the coastal economy (e.g. agriculture, public sewage works, major infrastructures, etc) can have an impact or influence in the ocean economy. However, as many activities related to the ocean economy can occur in non-coastal zones (service provision for example), the ocean economy is not necessarily a subset of the coastal economy. As a sectoral entity the ocean economy is likely to be much smaller (in value) that is the coastal economy.

This map defines the spatial structure of the coastal economy. The top (purple) coastal spatial scale on the map is the shoreline electoral districts. Beneath this are the (cream layer) coastal counties and beneath this is the Eurostat defined EU coastal regions (NUTS3) for Ireland (the green layer which extends underneath the other layers all the way to the coast). Marine activity might take place in the Ocean economy in the central white area but this is not part of the coastal economy at any spatial scale.

The population density in coastal regions of Ireland changes depending on the definition of the Irish coast one uses. The Irish coast as defined by the **EU (NUTS3[3])** has a population density is 59 inhabitants per km². At the **coastal county** definition it is 73 inhabitants per km² while at the **shoreline district level** it is 79 inhabitants per km².

The gross domestic product (valued at market prices) of Ireland's EU coastal (as defined by NUTS 3) economy (€170 billion) accounted for 96% of all production activity in the state in 2007. The value of the coastal county economy, based on the share of the value added in production by the labour located in the coastal counties is estimated to be €149 billion, the equivalent estimate of the value of the shoreline electoral districts economy is €44.3 billion. While the coastal counties make up 69% of land area, they account for an estimated 85% of the economic activity in the state.

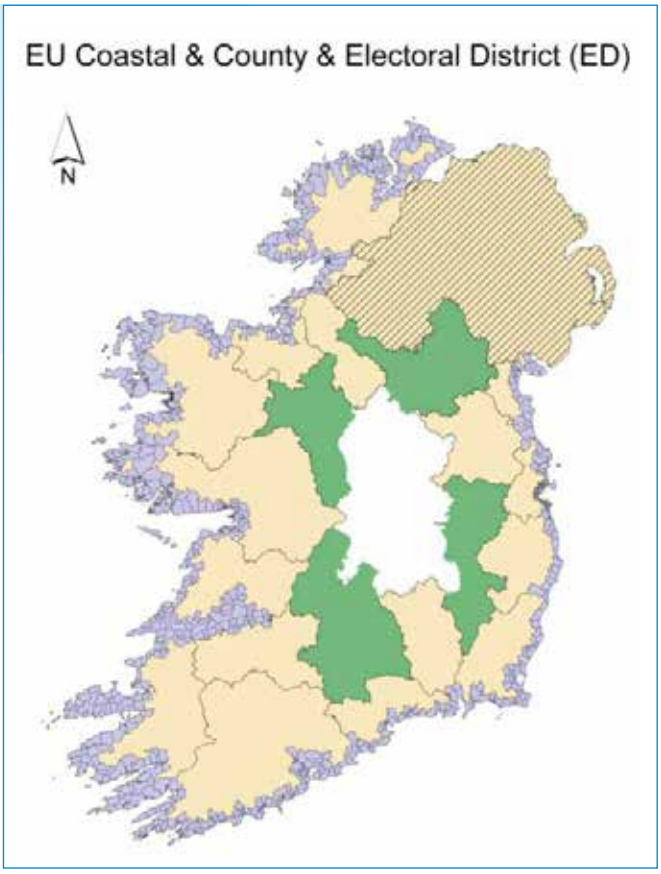

Figure 2.2
Irelands Coastal Economic Regions at Alternative Spatial Scales

[3]The Nomenclature of Units for Territorial Statistics is a geo-code standard for referencing the subdivisions of EU countries for statistical purposes. The Irish EU coast (NUTS3) level of aggregation is made up of 7 of the 8 NUTS3 regions in Ireland. The seven regions included in the definition are the Border, West, Dublin, Mid-East, Mid-West, South East and South West.

There is considerable overlap between activities in the ocean and coastal economies in Ireland. Shipping, port & maritime logistics, water based tourism and leisure activities, all to a large extent operate within the coastal economy as well as the ocean economy. The other marine service categories, such as high tech marine products and services, marine commerce and marine manufacturing are spread across the country but are still most likely to be found in the coastal counties rather than in non-coastal counties. The marine resource activities within the ocean economy of sea-fisheries, aquaculture, seafood processing, seaweed processing, oil and gas exploration and marine renewable energy production are also wholly contained within the coastal economy. A number of the marine manufacturing industries such as marine instrumentation are as likely to be found outside the coastal economy as inside it.

The value of the ocean economy for 2007, estimated in this report, represents approximately 2.3% of the total value of the coastal county economy and approximately 8% of the value of the coastal shoreline district economy. In the following sections the profile of Ireland's Ocean economy will be presented[4].

[4] For an in depth analysis of Ireland's Coastal Economy the interested reader should examine Hynes, S. and Farrelly, N. (2010).
A Socio-Economic Profile of Coastal Regions in Ireland, SEMRU Working Paper 10-WP-SEMRU-02. http://www.nuigalway.ie/semru/documents/hf_10_semru_wp2.pdf
Macken-Walsh, A. (2010). Operationalising Contemporary EU Rural Development: socio-cultural determinants arising from a strong local fishing culture,
SEMRU Working Paper http://www.nuigalway.ie/semru/publications.html

The Role of the Ocean Economy in Regional and Rural Development

The output and employment created by the marine sector is distributed widely throughout the country, with a large proportion occurring outside the most developed regions. This is particularly true of many of the activities involved in the commercial exploitation of primary marine resources. Commercial fishing, aquaculture and seaweed harvesting have an important role in the development of many regional economies particularly along the western sea board and play a key role in rural development. They provide livelihood options in rural areas where few other employment or income sources exist. This report found that in 2007, approximately 30% of gross value added in the marine sector and 41% of employment was located in the peripheral NUTS3 Border/Midlands/Western (BMW) region of the country. This activity was mainly located in the marine resources sector. This indicates the strong role marine resources, particularly marine food play in the less developed regions of Ireland.

Forty one percent of total marine employment was also located in the BMW region. The established marine market provides an important contribution to this region, particularly marine foods and oil and gas production and exploration. Marine food and oil and gas account for 47% of marine GVA in the Border region and 22% in the Western region. These two categories also accounted for 54% of marine employment in the Border region and 52% of employment in the western region in 2007. Cultural marine tourism offers further opportunities for rural development in the less developed coastal regions of the country and offers an alternative to fishing communities wishing to diversify into other marine based activities[5].

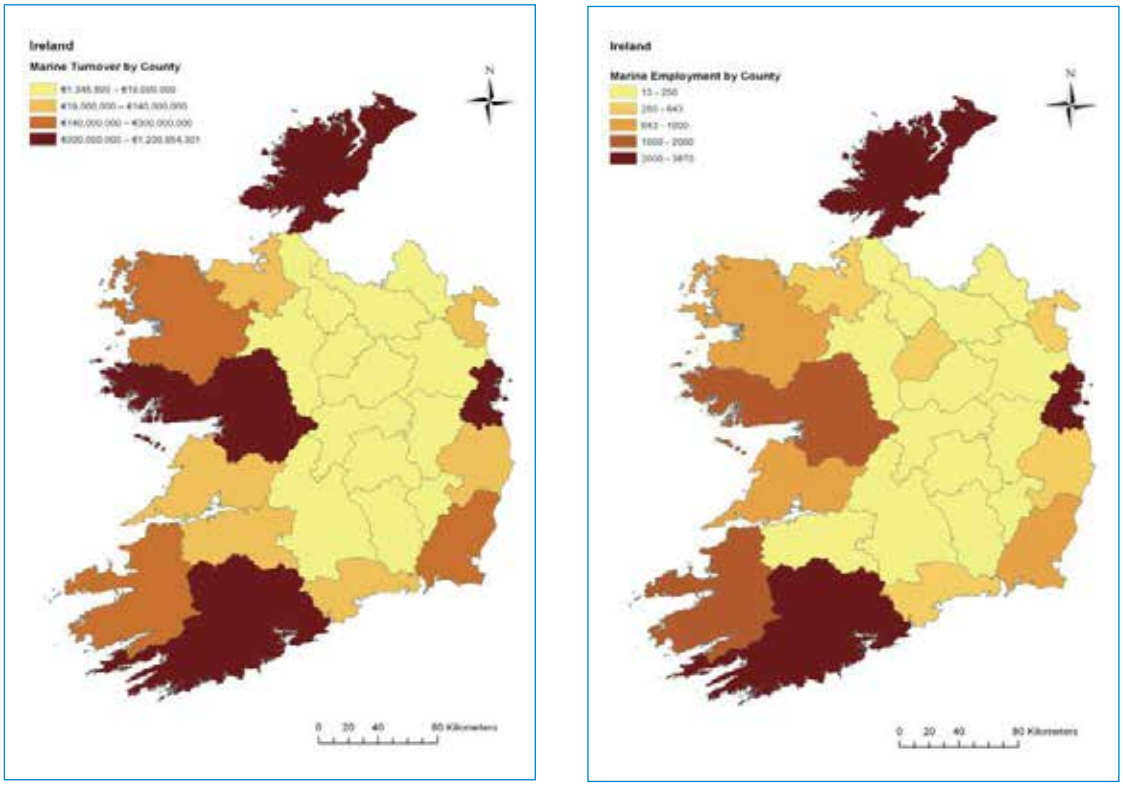

Figure 2.3. Turnover and Employment in the Ocean Economy by County

[5] Macken-Walsh, A. (2010). Operationalising Contemporary EU Rural Development: socio-cultural determinants arising from a strong local fishing culture, SEMRU Working Paper http://www.nuigalway.ie/semru/publications.html

As can be seen in Figure 2.3 above, counties such as Donegal, Mayo and Kerry, which lag behind in terms of the national average income per capita,[6] have a higher share of the ocean economy output and employment than some of the wealthier counties (as measured by income per capita) such as Wicklow, Kildare and Meath in the east of the country. Indeed, Donegal, which had only a 2.5% share in total primary disposable household income in the country in 2007, had an 8.5% share in total marine turnover and a 12% share in total marine related employment. This indicates that marine related activity is an important component in these regional economies and has an important role to play in both regional and rural development.

[6] Figures for average income per capita are derived from the CSO's National Income and Expenditure Annual Results for 2007. Income is composed of income of the self-employed, rent of private dwellings, remuneration of employees and net interest and dividends.


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3. A Profile of Ireland's Ocean Economy

Ireland's ocean economy is comprised of a large number of companies operating across a variety of industries. These industries can be classified as marine services, marine resources and marine manufacturing. Alternatively these industries can also be categorised by their operation in established or emerging markets. New uses of the seas that surround Ireland in industries such as renewable energy, marine commerce and biotechnology will increasingly emerge to compete with and complement traditional uses such as fisheries, shipping and recreation. Therefore, rather than separate out activity by the three broad categories of marine services, marine resources and marine manufacturing, we instead profile the marine sector by **Established** and **Emerging** markets and industries.

Established markets refer to the traditional sectors that are usually associated with marine related activity. These include shipping and maritime transport, water based tourism, the cruise industry, fisheries, aquaculture, seafood processing, offshore hydrocarbon exploration and extraction and marine manufacturing. **Emerging** markets refer to those industries that are still at a relatively early stage of development, are R&D intensive and/or use the latest cutting edge technology in their pursuit of economic growth. Firms in this category also tend to have considerable potential for knowledge creation. It has also been pointed out that fledging firms in these emerging markets have a pervasive influence across the wider economy such that the development of an individual marine sector in this category will have a positive impact on other more established industries in the wider economy[7]. For example the development of off-shore renewable energy offers further growth opportunities to shipping and port service providers who already have the skills necessary to provide maritime logistics support to the energy device operators.

The pursuit of 'new' and 'smart' sectors in the ocean economy does not mean that the role of more traditional and longer established sectors is considered to be of any less importance. Indeed, the established marine industries employ approximately 16,340 people (95 percent of total marine related employment) and the traditional marine resource activities of fisheries and aquaculture, in particular, present employment opportunities in rural areas where few other employment opportunities often exist. Both the established and emerging markets include firms that trade internationally as well as those primarily trade in domestic markets.

Ireland's Ocean Economy		
Established Marine Markets		Emerging Marine Markets
Water-Based Tourism & Leisure	Sea Fish Landings	High Tech Products and Services
Shipping & Maritime Transport	Aquaculture	Marine Commerce
International Cruise	Seafood Processing	Marine Renewable Energy
Other Services	Hydrocarbon Exploration	Biotechnology & Bio-products
Boat Building	Gas Production	
Marine Construction & Engineering		
Other Marine Manufacturing		

Figure 3.1 Ireland's Ocean Economy

[7] Forfás (2010) Making it Happen - Growing Enterprise for Ireland. Forfás Publication, Wilton Park House, Wilton Place, Dublin 2.

Economic and Commercial Profile

In 2007 the ocean economy had a turnover[8] of €3.4 billion, of which €1.44 billion was direct Gross Value Added[9] (for comparison, the GVA of selected sectors in the Irish economy are shown in Appendix 2).

The Irish Marine sector employed approximately 17,000 individuals. Ireland's total Gross Domestic Product (GDP) in 2007 was €189.7 billion. After combining the direct and indirect impacts of the sector into account, the gross value added to national GDP from marine economic activity is €2.4 billion or approximately 1.2% of GDP.

The established industries in the marine sector account for 95% of total marine turnover. This category is dominated by marine tourism and maritime transport (Table 3.1). Within the established sector, water-based tourism and leisure; is the largest contributor in terms of turnover, value added, direct and indirect[10] gross value added and employment. Shipping and maritime transport, and the companies that provide services to the maritime transport industry, is the next largest category. Within the emerging industries sector, marine commerce and high tech marine products and services make the largest contribution in terms of turnover and value added. However the marine biotechnology and bio-products category (algae and marine biotechnology) is also an important category in terms of employment.

Table 3.1 also provides a measure of both the direct and indirect gross value added generated by the marine sector. Multipliers derived from Irish Input-Output (IO) 2005 tables, were applied to each NACE category in order to calculate the indirect contribution of each category. For categories where public data on turnover, GVA, and employment was not available, a company survey was conducted by SEMRU. With regard to the complementary survey data collected by SEMRU for the categories unavailable from the Central Statistics Office (CSO), the multiplier applied was taken from the NACE category that the enterprise was most likely to be categorised under.

	Turnover (€'000)	Direct GVA (€'000)	Direct Employment (FTE)	Direct & Indirect GVA (€'000)
Established Markets				
Shipping & Maritime Transport	889,018	328,579	2,194	516,929
Water -based Tourism & Leisure	944,380	453,310	5,836	826,650
Cruise	45,323	30,355	0	55,355
Other Marine Services	140,110	62,420	569	111,386
Sea-Fisheries	251,000	100,307	2,200	168,347
Aquaculture	105,700	42,280	1,061	70,959
Seafood Processing	395,593	88,204	2,090	155,239
Oil & Gas	197,300	137,117	790	220,758
Marine Manufacturing	265,227	110,429	1,600	176,965
Established Markets Sub-Total	**3,233,651**	**1,353,001**	**16,340**	**2,302,588**
Emerging Markets				
High Tech Marine Products & Services	43,618	27,299	350	42,796
Marine Commerce	99,595	47,138	65	78,589
Marine Biotechnology & Bioproducts	18,075	8,671	185	14,552
Marine Renewable Energy	6,218	4,415	101	7,108
Emerging Markets Subtotal	**167,506**	**87,523**	**701**	**143,045**
Total	3,401,157	1,440,524	17,041	**2,445,633**

Table 3.1 Direct Turnover, Direct and Indirect Gross Value Added and Employment by Category

[8] Turnover is the value of goods and services produced by a company

[9] Gross Value Added (GVA) refers to a sectors turnover (output) minus intermediate consumption (the inputs into the process of production). It is measured at basic prices, excluding taxes less subsidies on products. Value added at basic prices by industry is equal to the difference between output (basic prices) and intermediate consumption (purchasers' prices). GVA is the preferred method for calculating a sectors value as it removes the danger of double counting. GVA is the contributions of individual sectors or industries to Gross Domestic Product.

[10] The indirect impact of a sector is the value-added generated in other industries supplying inputs to the sector of interest.

Table 3.2 provides a comparison of the turnover and employment for each category in 2003 and 2007. In total, turnover in the marine sector grew from €2.2 billion in 2003 to €3.4 billion in 2007. This represents a 35% increase. GVA increased from €677 million in 2003 to €1.4 billion in 2007. This represents a 66% increase in GVA between 2003 and 2007. Over the period, employment in the marine sector increased from 15,924 to 17,041. The traditional, established marine categories increased their combined turnover from €2.2 billion to €3.2 billion in the four year period. This represented a 57% increase. Employment in this category grew from 15,739 in 2003 to 16,340 in 2007. Firms in the emerging marine markets also increased their combined turnover from €9 million to €168 million. Employment in these firms also saw a dramatic increase over this same period from 185 to 701 persons.

	Turnover (€ millions)		Direct Employment		Direct GVA	
	2003	**2007**	**2003**	**2007**	**2003**	**2007**
Established Markets						
Shipping & Maritime Transport	584	889	2,005	2,194	102	328
Water -based Tourism & Leisure	566	944	5,271	5,836	306	453
Cruise Liners	35	45	0	0	23	30
Other Marine Services	121	140	779	569	51	62
Sea-Fisheries	210	251	2142	2200	118	100
Aquaculture	102	106	1,394	1,061	42	42
Seafood Processing	366	396	2,802	2,090	94	88
Oil & Gas	137	197	439	790	78	137
Marine Manufacturing**	116	265	907	1,600	45	110
Established Markets Sub-Total	**2,237**	**3,233**	**15,739**	**16,340**	**859**	**1,350**
Emerging Markets						
High Tech Marine Products & Services*	Unavailable	44	Unavailable	350	Unavailable	27
Marine Commerce	Unavailable	100	Unavailable	65	Unavailable	47
Marine Biotechnology & Bioproducts	9	18	175	185	6	8
Marine Renewable Energy	0	6	10	101	0	4
Emerging Markets Sub-Total	**9**	**168**	**185**	**701**	**6**	**86**
Total	**2,246**	**3,401**	**15,924**	**17,041**	**865**	**1,436**

Table 3.2 Direct Turnover, Employment and Gross Value Added for 2003 and 2007

Note: For the purpose of comparability and to insure consistency of marine data collection and analysis in the future we have adjusted the 2005 Marine Institute (MI) Marine Ocean Report figures for Shipping & Maritime Transport, Cruise Liners and Marine Renewable Energy. We now use the Shipping & Maritime Transport figures for 2003 available from the CSO Annual Services Enquiry.

** This category was included in marine manufacturing category in the MI Report (2005).*

*** The Manufacturing category is still not directly comparable across years as the 2003 figure excluded a number of activities such as water construction that we were not able to adjust. This category also included High Tech Marine Products & Services in the 2005. The estimate in the 2005 report for this category used MI MIDI Firm data that was incomplete.*

Photography: Andrew Downes Photography

3.1. Established Marine Markets

The Established Marine Market Sector in 2007 had a turnover of €3.2 billion and provided employment to 16,340 individuals representing 95% of the turnover and 96% of employment in the Ocean Economy. This sector includes shipping and maritime transport, water-based tourism and leisure, international cruise and other marine services.

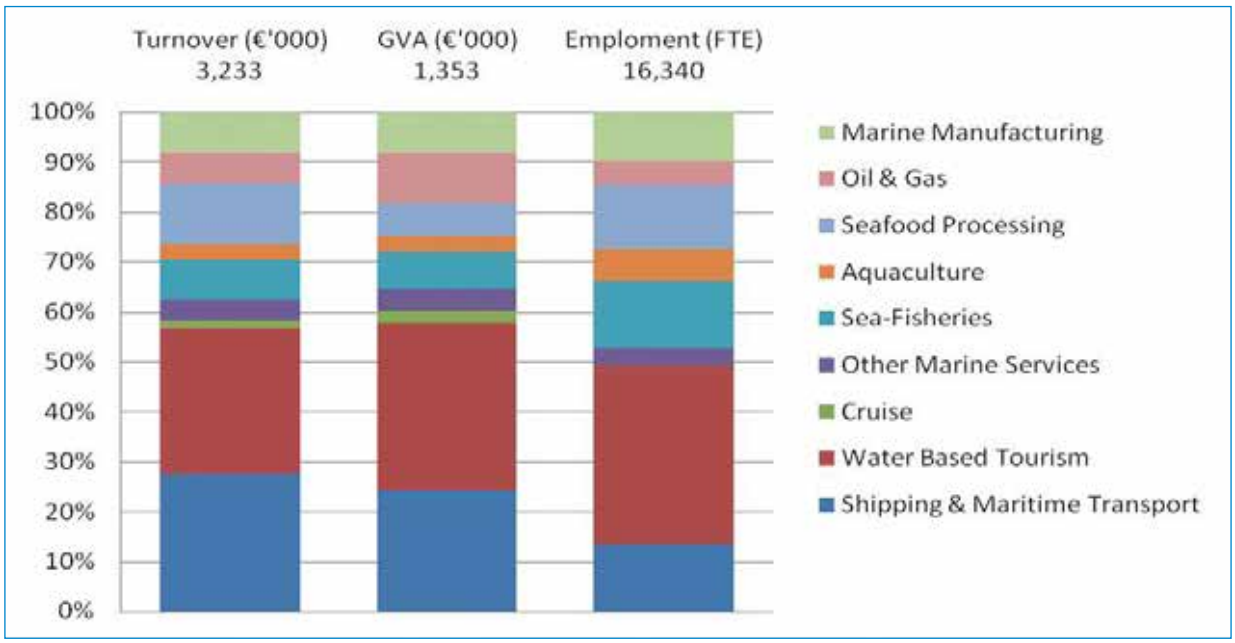


Figure 3.2 Proportional Contribution of each Category to the Established Irish Marine Market

Shipping & Maritime Transport

Shipping can be grouped into three categories; bulk freight, unitised/container freight and passenger transportation. The shipping industry is dominated by large well-established firms involved in either the Freight or Passenger Ferry services (or both). These firms include Stena, P&O, the Irish Continental Group, and Arklow Shipping. Ninety nine percent of Ireland's total imports and exports by volume and ninety five percent of its value are transported by sea.

Profile

Shipping

- Ship Owners and Operators

Port & Maritime Logistics

- Shipping Agents and Brokers
- Ship Management
- Liner and Port Agents
- Port Companies
- Ship Suppliers
- Container Shipping Services
- Stevedores
- Roll-On Roll-Off Operators
- Load-On Load-Off Operators
- Custom Clearance/Freight Forwarders
- Safety and Training

Shipping and Maritime Services NACE Four-Digit Code: 61.10, 63.11, 63.22 and 71.22	
Turnover	€889,018,000
Gross Value Added	€328,579,000
Exports	€293,883,000
Employment FTE	2,194
Data Sources:	CSO – Annual Services Enquiry 2007

The turnover generated by shipping in 2007 was €693 million, of which €294 million was from exports. Total gross value added generated by shipping was €194 million. The turnover generated by Port and Maritime Logistic services was €196 million while gross value added generated by the Port and Maritime Logistic services was €134 million.

Shipping employed 1,149 individuals in 2007 while related Port and Maritime Logistics services employed 1,045 individuals.

The majority of shipping activity occurs around the nine commercial ports on the coast of Ireland; Cork, Drogheda, Dublin, Dundalk, Dun Laoghaire, Galway, New Ross, Foynes and Wicklow. Companies providing port and maritime services are located across the nine main commercial ports in Ireland.

Turnover and employment increased significantly between 2003 and 2007 in the shipping and maritime category. Turnover increased by 52% and employment by 9%. This was a direct result of the buoyant economic conditions that prevailed during this period and the resulting strong export of goods and increased imports into Ireland. The vast majority of these exports and imports were transported by sea.

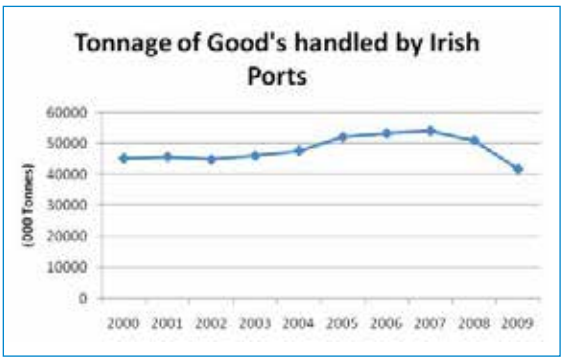


Figure 3.3. Volume of Good's handled by Irish Ports

Water-based Tourism & Leisure

Water-based tourism and leisure is the largest single contributor to the Irish ocean economy and has historically been an important sector for the Irish economy in general. The tourism industry contributed an estimated €6.45 billion to the Irish economy in 2007. Marine tourism and leisure (i.e. the activities listed below) accounts for 7% of this figure.

Profile

Angling
- Sea Angling from boats
- Sea Angling from the Shore

Watersports
- Sailing at Sea
- Boating at Sea
- Water Skiing/Jet Skiing
- Surfing, Sail Boarding
- Sea Kayaking
- Scuba Diving/Snorkelling
- 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

Marine Based Tourism and Leisure – Domestic & Overseas	
Turnover	€944,379,818
Gross Value Added	€453,310,000
Employment FTE	5,836
Data Sources:	ESRI Report 2004; SEMRU Company Surveys; Failte Ireland Statistics; CSO Estimates for 2002-2007.

In 2007, marine-based tourism and leisure generated a turnover of €944 million and added €453 million to Irish GDP. It also supported 5,836 individuals in employment.

Irish sea-angling has a well-established international market, particularly in the German, Dutch, Belgian, and increasingly the French market. In peak season – April to October, Failte Ireland estimate that 50% to 60% of business may be from overseas clients. Large sea-angling companies actively advertise at overseas angling exhibits. Coastal attractions, such as the Cliffs of Moher, also receive high numbers of international visitors. Water-based activities, such as diving and surfing, have a strong domestic market and are becoming increasingly popular for school trips and weekend breaks.

Marine based tourism and water-based activities are offered all along the coast of Ireland. However, approximately 33% of water based activity companies are found in the South-West, in Cork and Kerry.

Turnover from marine based tourism increased by an estimated 62% between 2003 and 2007. This increase in water-based tourism was as a result of a general increase in tourism during this period. It also represents the increase in water-based activity operators in Ireland, particularly charter fishing, surfing, sailing, sea kayaking and diving activities during this period.

International Cruise Industry

The cruise industry generated €29 billion in total economic benefits for Europe in 2007. The UK is the European leader in the provision of international cruises in Europe. The Irish Cruise industry is still embryonic compared to its European counterparts. Currently, there are no cruise liners that embark from Irish Ports.

Profile

Main ports of call for cruise liners include

Dublin	Cork
Waterford	Galway

International Cruise Ships	
Average passengers per port call	787
Number of calls to the three main ports	130
Average Expenditure per person	€443.50
Total Expenditure by Cruise Passengers	€45,323,000
Data Sources:	Number of Stops - CSO, Traffic Statistics 2008; Expenditure Levels - Maloney & Ward (2008)[11].

A total of 130 liners docked at Irish ports in 2007, carrying 102,000 passengers. The average number of passengers on board each liner was 787. A report commissioned by the Port of Cork estimated that the average spend per disembarking cruise passenger was €443.5 in 2007 which equates to an estimated €45.3 million in total cruise liner related expenditure in Ireland.

Expenditure by cruise passengers disembarking at Irish ports increased from €35 million to €45 million between 2003 and 2007. This is due to a higher number of cruise liners stopping at Irish ports and a general upward increase in global tourism expenditure.

[11] Maloney, R. & Ward, A. (2008). Economic Contribution of the Port of Cork to the Irish Economy, UCC Report, University College Cork, Cork

Other Marine Services

Other Marine Services are comprised of small and medium sized enterprises involved in ship surveying, boat sales, chandlery, and the retail of seafood in fishmonger shops.

Profile

- Chandlery
- Boat Sales
- Ship Surveyors
- Retail of seafood in Fishmonger Shops

Other Services	
Turnover	€140,110,000
Gross Value Added	€62,420,000
Exports	€10,876,300
Employment FTE	569
Data Sources	Irish Revenue Data; SEMRU Company Survey

In 2007, turnover from these other marine services was €140.1 million. Approximately €10.8 million of this was derived from exports. Other marine services contributed €62.4 million in GVA to the Irish economy and employed a total of 570 Full-Time Equivalent individuals.

Other Marine 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.

Other marine services, particularly retail, chandlery and boat sales increased their turnover from 2003 to 2007. This is likely due to the increased participation in marine water-based activities during this period.

Photography: David Branigan

Sea Fisheries

In 2007, the Irish fishing fleet comprised of 1,935 vessels with a total capacity of 81,600 tonnes and a total engine power of 207,000KW. The Irish fishing fleet is divided into five categories: a refrigerated seawater pelagic (RSW) segment (22 vessels), a beam trawler segment (14 vessels), a polyvalent segment (1,737 vessels), a specific segment (130 vessels) and an aquaculture segment (32 vessels).

Profile

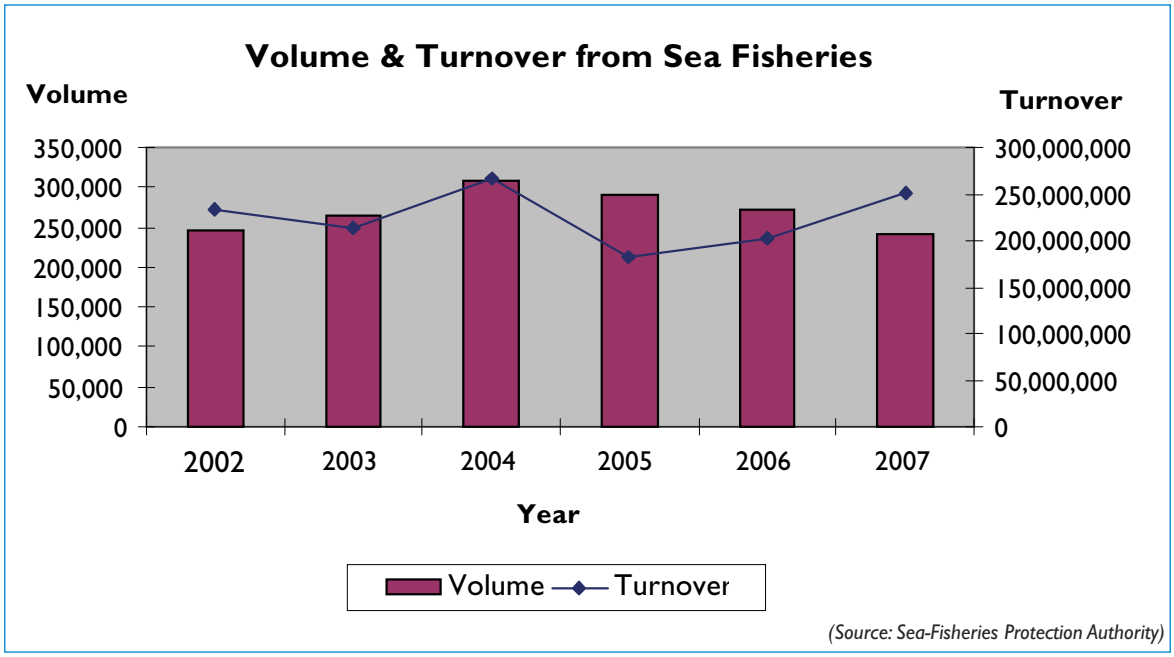
Fishing Segments
- Pelagic
- Polyvalent
- Beam-trawl
- Specific

Main Target Species

Fin Fish
- Mackerel
- Herring
- Horse Mackerel
- Blue Whiting
- Monkfish
- Megrim
- Haddock
- Whiting,
- Cod,
- Sole
- Plaice

Shellfish
- Lobster
- Dublin Bay prawns
- Mussels
- Scallops
- Razor Clams

Fish Landings NACE Code 05.01	
Turnover	€251,000,000
Gross Value Added	€100,307,000
Exports	€200,312, 000
Employment	2,200
Data Sources:	Sea Fisheries Protection Agency Annual Report 2007 CSO – Quarterly National Household Survey



(Source: Sea-Fisheries Protection Authority)

Figure 3.4 Production Value of Sea-Fisheries 2002 - 2007

Figure 3.4 presents year-on-year trend analysis of turnover for the sea fisheries industry. Landings and turnover for sea-fisheries peaked in 2004 at €270 million. However, due to quota reductions and a decrease in total fishing effort, landings decreased steadily from 2004 to 2007. Turnover from sea-landings increased by 19% from 2003 to 2007. This increase in value is due to the increase in the market price for landings.

Ireland had fish landings valued at €251 million in 2007. Exports from fish landings were valued at €200.3 million. Commercial fishing contributed an estimated €100.3 million in Gross Value Added to the Irish economy in 2007.

Sea fisheries employed 2,200 individuals in 2007. In the 2006 Irish Census of Population 1,717 persons declared that their main occupation was in fishing or fishing related industries.

Fishing communities are distributed around the coast of Ireland, centred particularly around 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.

Photography: John Joyce

Photography: David Branigan

Aquaculture

Aquaculture can be divided into finfish and shellfish farming. Shellfish production provided 37,112 tonnes of sea food in 2007 and finfish (primarily, salmon) provided 11,238 tonnes. There were 573 active aquaculture licensees in Ireland in 2007. Of these, there were 494 active shellfish licences (86% of total), 75 finfish licences, and 4 licences for the cultivation of algae. The greatest numbers of licences were for oyster farming (268 licences) and mussel farming (167 licences).

Profile

Finfish
- Salmon
- Trout (Sea Reared)
- Arctic Char

Shellfish
- Mussels
- Pacific and Native Oysters
- Clams
- Scallops
- Abalone
- Sea Urchins

Aquaculture NACE Four-Digit Code: 05.02	
Turnover	€105, 700,000
Gross Value Added	€42,280,000
Exports	€22,560,000
Employment FTE	1,061
Data Sources:	BIM – The Status of Aquaculture 2007 CSO – Trade Exports

The total value of the shellfish production in 2007 was €47.2 million, while finfish production was valued at €58.4 million. Exports from aquaculture were valued at €22.5 million with France remaining the key destination market.

Aquaculture employed 1,981 individuals in 2007. Of these, 686 were employed full-time, 478 were employed part-time, and 817 were employed on a seasonal basis. The FTEs employed by aquaculture were 1,061.

Shellfish aquaculture activities are widely distributed around 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.

Figure 3.5 present the annual volume and production value from aquaculture in Ireland for 2002 to 2007. Aquaculture production peaked in 2005 at 63,000 tonnes. Since 2005, production levels have decreased with the 2006 to 2007 period experiencing a decline of 17%.

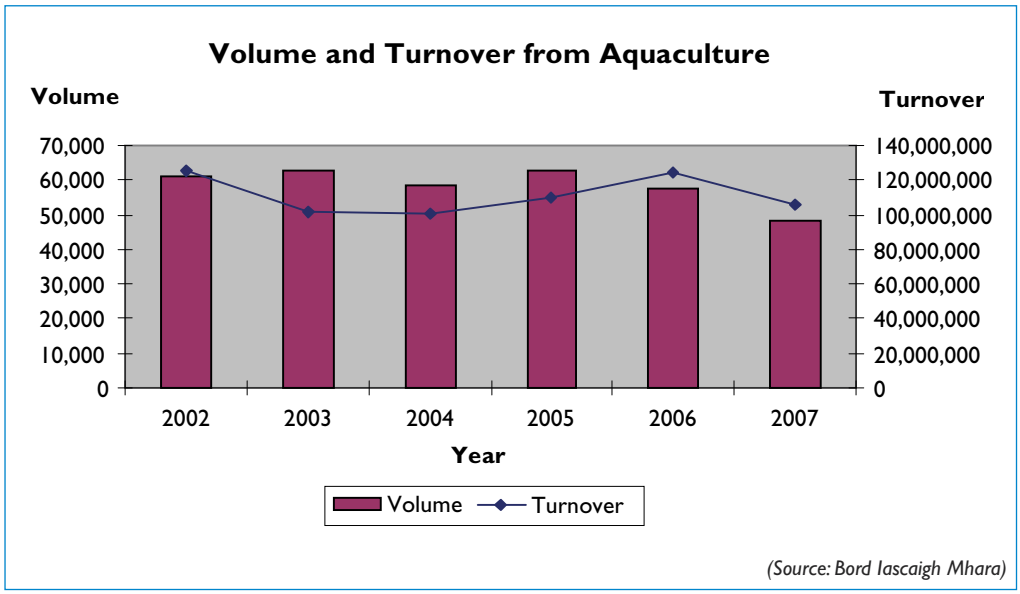


Figure 3.5 Volume and Production Value of Aquaculture 2002 – 2007

Turnover from overall aquaculture marginally increased by 4% between 2003 and 2007. Turnover in shellfish increased by 13% during this same period. Turnover in finfish fell by 2% between 2003 and 2007. The decline in finfish output value is due to a number of reasons including falling prices, environmental issues pertaining to licenses, disease outbreaks, farm closures and increased costs.

Photography: David Branigan

Seafood Processing

The seafood processing industry is dependent on both sea-fisheries and aquaculture for its raw input. The industry is comprised mainly of small and medium sized enterprises. Less than 5% of all Irish seafood processing companies employ more than 50 people full-time.

Profile

- Finfish Processing
- Shellfish Processing

Seafood Processing CSO - NACE Four-Digit Code: 15.02	
Turnover	€395,593,000
Gross Value Added	€88,204,000
Exports	€280,159,000
Employment FTE	2090
Data Sources:	CSO – Census of Industrial Production, 2007

The turnover generated by Ireland's seafood processing companies in the handling, processing and distribution of fish in 2007 was €395.5 million. Approximately €280 million of this was from the processing of seafood for export. The industry contributed an estimated €88.2 million in Gross Value Added to the Irish economy in 2007 and represents 1% of GVA in the Irish food sector in 2007.

The Irish seafood processing industry employed 2,090 full-time equivalent individuals in the handling, processing and distributing of fish in 2007.

Seafood Processing activities are distributed around the coast of Ireland, but are particularly concentrated around the six commercial fishing harbours of Killybegs, Co. Donegal, Ross a Mhil, Co. Galway, Daingean, Co. Kerry, Castletownbere, Co. Cork, Dunmore East, Co. Waterford, and Howth in Co. Dublin.

Turnover in seafood processing increased by 8% between 2003 and 2007. However, due to smaller processing plants closing and/or amalgamating, employment in the sector fell from 2,800 to 2,090 employees (-25%).

Oil & Gas Exploration and Production

Ireland has been a producer of gas since the discovery of gas reserves in Kinsale, Co. Cork in 1971. The Oil and Gas industry in Ireland is made up of two sub-categories, oil and gas exploration and, the extraction and production of gas.

Profile

- Hydrocarbon Exploration
- Extraction and Production of Oil and Gas

Oil and Gas NACE Four-Digit Code: 11.1	
Turnover	€197,300,000
Gross Value Added	€137,117,000
Employment FTE	790
Data Sources:	CSO – Census of Industrial Production SEMRU Company Survey

The turnover generated by oil and gas exploration and production was €197.3 million in 2007 and the sector generated €137 million in gross value added.

Oil and Gas Exploration and Production employed approximately 790 individuals in 2007.

Companies involved in the extraction and production of gas in Ireland are based in Cork and Dublin. However, the companies that provide services to the gas production companies are located across Ireland.

Turnover from hydrocarbon exploration increased significantly between 2003 and 2007. This is primarily due to the discovery of gas reserves off Belmullet, Co. Mayo in 1999 and the subsequent and on-going development of the Corrib gas field by the Corrib consortium.

Photography: Aofhan Fitzgerald

Marine Manufacturing

The majority of Marine Manufacturing companies are small and medium sized enterprises which employ between ten and thirty individuals.

Profile

Boat and Related Equipment Manufacturing

- Boat Manufacturing
- Sail Making
- Net Manufacturing
- Boat & Ship Repair

Other Marine Manufacturing

- Marine Instrumentation
- Aquaculture Technology
- Water Construction
- Marine Industrial Engineering
- Other Marine Manufacturing

Marine Manufacturing NACE Four-Digit Code: 45.24 for Water Construction	
Turnover	€265,227,000
Gross Value Added	€110,429,000
Exports	€12,850,000
Employment FTE	1,600
Data Sources:	CSO, Prodcom; Census of Industrial Production; SEMRU Company Survey; Census of Construction and Building 2007

In 2007 marine manufacturing had a turnover of approximately €265.2 million with exports accounting for €12.8 million. Marine manufacturing generated €110.4 million in gross value added to the Irish Economy and employed 1,600 individuals.

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).

Although the figures for marine manufacturing presented in Table 3.2 are not directly comparable across the two years, we can still state that marine manufacturing grew significantly between 2003 and 2007. The growth in this category was primarily due to a number of large water-based construction projects carried out during the reference period, particularly in the areas of harbour and port development.

3.2. Emerging Marine Markets

The Emerging Marine Sectors (representing: 6% of turnover; 4% of employment; 6% of direct GVA – 2007 figures) such as Marine Renewable Energy, Marine Commerce, High-Tech Marine Services and Marine Biotechnology, have, according to global market forecasts, a very significant potential to contribute to tomorrow's ocean economy and indeed in some cases; for example, marine renewable energy, to become a dominant force.

> Marine Biotechnology, with an estimated global market valued of €2.8billion (2010) and a cumulative annual growth rate of 4-5% (more optimistic forecasters put this at 10-12%). Marine biotechnology is expected to be one of the major growth sectors / enabling technologies of the 21st century.
>
> MB-ESF (2010)

The Irish marine sector consists of a number of emerging markets and markets with currently untapped potential. For example, nutraceuticals and functional foods that are derived from marine organisms constitute an emergent industry with considerable potential for knowledge creation and value-added growth applied to food, drugs, biomaterials, nutraceuticals and industrial processes.

Marine renewable energy represents a major growth and development opportunity for Ireland reflected in the publication by government of the draft Offshore Renewable Energy Development Plan (November 2010) and SEAI's Ocean Energy Roadmap to 2050 (November 2010).

High tech marine products and services are an emerging market in the broader ICT and high tech service and manufacturing industries. The publication of the SmartOcean Strategy (Marine Institute, March 2010) highlights the significant potential that exists

These new opportunities in the marine area were identified by the Marine Institute five years ago (National Marine Foresight Exercise 2005-2006) on the basis of a global market assessment and significant investments in marine research and development capacity and infrastructure have taken place since then. They also build on Ireland's strengths in a number of key sectors (e.g. ICT and Life Sciences) firmly established in the wider economy. Emerging marine markets identified and profiled below include:

- Marine Commerce
- High Tech Marine Products & Services
- Marine Biotechnology and Bioproducts
- Marine Renewable Energy

Capitalising on these emerging markets and opportunities will help the Irish marine economy to achieve the dual objectives of economic growth and job creation. Figure 3.6 presents the proportional contribution of each these industries to the total emerging marine market.

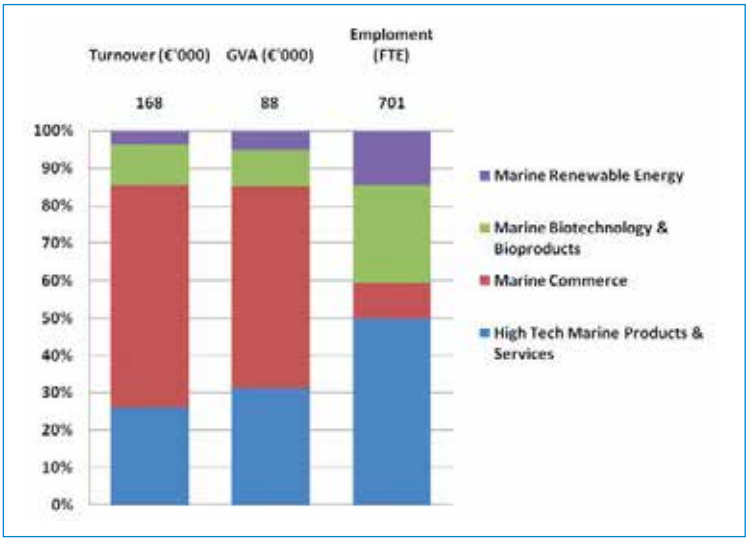


Figure 3.6. Proportional Contribution of each Category to the Emerging Marine Market

High Tech Marine Products and Services

High Tech Marine Products and Services are comprised of a small but diverse group of companies with core capabilities in the areas of information and communications technologies. Products include *in situ* sensor networks (chemical, biological, acoustic), wireless and fibre communications platforms, data management and visualisation, geographical information systems, as well as advanced simulation, modelling and forecast technologies. While the category is current dominated by SME's, a number of Irish-based multinationals are also engaged in the development of technology enabled products and services for marine and environment related industries; namely wireless communication platforms, streaming data analytics and internet-based visualisation tools. The category is supported by R&D activity and several national research and demonstration infrastructures including SmartBay, SmartCatchment and Marine Renewable Energy test facilities. These facilities are available to technology developers for the testing and trials of their products and services.

Profile

- Marine Engineering Consultancy
- Meteorological Consultancy
- Environmental Consultancy
- Hydro-Survey Consultancy
- Project Management Consultancy
- ICT Solutions
- Geo-Informatics Services
- Yacht Design

High Tech Marine Services	
Turnover	€43,618,052
Gross Value Added	€27,299,266
Exports	€10,876,300
Employment FTE	350
Data Sources:	SEMRU Company Survey

High tech marine products and services had a turnover of € 43.6 [see Table 3.1] million in 2007 with approximately 25% of this turnover being represented by exports. The category generated €27 million in gross value added to the Irish economy and employed 350 individuals in 2007.

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.

Companies which provide high tech marine products and services to the broader marine sector also represent a growing industry. The demand for these services grew significantly between 2003 and 2007 with the advent of new marine environmental regulations that created new market niches in ocean monitoring and green technologies. New marine enterprises, such as ocean energy device companies, have emerged during this period.

Marine Commerce

Marine commerce, as defined here, refers to legal services, banking/finance services, and insurance. In this sub-sector companies provide services across a range of marine categories; primarily, maritime transportation, fisheries and aquaculture and energy.

Profile

- Marine Financial Services
- Marine Legal Services
- Marine Insurance

Marine Commerce	
Turnover	€99,595,000
Gross Value Added	€47,137,850
Employment FTE	65
Data Sources	SEMRU Company Survey

Marine commerce had a turnover of €99.5 million in 2007 and generated €47 million in gross value added to the Irish economy and employed 65 (Full-Time Equivalent) individuals.

Companies that provide marine commerce services are primarily located in Dublin, Cork, and Galway. The majority of these companies are large international firms, who have marine-related divisions.

Marine commerce activities increased from 2003 to 2007, particularly in the areas of leisure craft financing and insurance. This was as a result of increased participation by the public in water-based activities, particularly sailing and boating during the Celtic Tiger era which required additional marine brokerage and insurance services.

Photography: David Branigan

Marine Biotechnology and Bioproducts

Marine biotechnology, the extraction of value added products and processes from marine organisms, finds economic applications in novel drug development, bio medical devices, food ingredients and industrial chemicals.

Ireland's emerging marine biotechnology industry is diverse, spanning different industry sectors and contributing to an array of novel products and processes. Marine biotechnology applications are already evident in a range of bio-products in what are emerging markets and include medical devices, pharmaceuticals, food products – including functional foods, cosmetics, agrichemicals, fine chemicals, proteins and biofuels.

The Irish seaweed industry supplies a number of other sectors of the economy including the agriculture and horticulture, food processing, cosmetics, thalassotherapy and biopharma (functional foods and nutraceuticals) sectors. Research is also on-going with regard to the use of marine micro algae as a bio-energy provider.

Profile

- Seaweed Harvesting
- Seaweed Products
- Marine Derived Bio-Products

Marine Biotechnology and Bioproducts	
Turnover	€18,075,000
Gross Value Added	€8,671,000
Exports	€6,355,000
Employment FTE	185
Data Sources:	SEMRU Company Survey

The turnover generated by the marine biotechnology and bioproducts industry in 2007 was €18 million. Exports of €6.3 million, mainly to the UK, Spain, France, and the US, accounted for a third of the turnover. The gross value added to the Irish economy was €8.6 million.

In terms of full time equivalence, 185 individuals were employed within the marine biotechnology and bioproducts industry in 2007.

Seaweed harvesting takes place around the coast of Ireland, with particular concentrations in Co. Galway, Co. Donegal, Co. Sligo, Co. Kerry, and Co. Cork.

Turnover in marine biotechnology and bioproducts production and products doubled between 2003 and 2007 due to a number of new entrants into the seaweed market. The seaweed-based biotechnology category has seen a significant increase in growth as demand for seaweed-based products and derivatives increase both in Ireland and abroad.

Marine Renewable Energy

In 2007, there were eight companies actively involved in the design, development, testing and deployment of marine renewable energy devices in Ireland. These companies utilise a number of facilities and services developed by the public and private sector for the testing and development of prototypes.

The marine renewable energy industry can be broken up into two categories, companies that are commercial and companies that are pre-commercial.

The very significant potential value of the European / Atlantic seaboard marine renewable energy resource in terms of turnover, value-added and employment, has been described in a number of recent reports (EWEA, 2009, Eur-OEA, 2010, Marine Board-ESF, 2010) and is reflected in significant investments by foreign companies in Ireland and elsewhere along the European Atlantic Seaboard.

The offshore wind energy industry is, in the main, non-indigenous and importing technology know-how and equipment to harness Ireland's natural wind energy resource. The Irish wave and tidal energy industry is a mainly indigenous, knowledge-based and highly innovative group of companies primarily focussing on the pre-commercial design stage. In 2007, over €100 million was invested in pre-commercial design activity (SEMRU Company Survey).

Profile

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

Marine Renewable Energy	
Turnover	€6,218,000
Gross Value Added	€4,415,000
Employment	101
Data Sources:	SEMRU Company Survey

In 2007, marine offshore wind had a turnover of just €6.2 million. This was from one offshore wind farm operator supplying offshore renewable energy to the market. The industry generated €4.4 million in gross value added to the Irish economy. The industry invested an additional €51 million in the development of the Irish offshore wind sector in 2007.

Wave and tidal energy companies, who are at the pre-commercial R&D stage of development, invested €50 million in the development of Irish off-shore renewable technology in 2007.

There were 101 full-time equivalent individuals in the field of marine renewable energy (offshore wind, wave and tidal) in 2007. This employment was primarily concentrated in the design and development of prototypes.

Activity in the marine renewables category increased significantly between 2003 and 2007, particularly in terms of investment and employment. Investment from both Irish and International companies increased from €18 million in 2003 to €101 million in 2007.

Photography: David Branigan

4. Non-Market Marine Goods and Service

All of the marine goods and services examined in Section 3 are exchanged in the market place with individuals expressing their preferences via their individual purchasing behaviour. The price an individual pays reflects how much, or at the very least what, they are willing to pay for the benefits they derive from consuming that marine good or service. However, many ecosystem goods and services, provided by Ireland's marine resources, are not traded in actual markets. In these cases market price data are missing even though these ecosystem goods and services generate significant non-market or external benefits. In addition to interpreting the market data, methods of economic valuation also provide several tools that may be employed to value benefits that are derived from marine non-market goods and services.

Ecosystem goods and services *are the benefits arising from the ecological functions of healthy ecosystems. Such benefits accrue to all living organisms, including animals and plants, rather than to humans alone. There is a growing recognition of the importance to society that ecological goods and services provide for health, social, cultural, and economic needs.*

Irish Marine Ecosystem	Associated Ecosystem Goods and Services	
	Supporting services	***Regulating services***
Estuaries and Lagoons	Nutrient cycling	Gas and Climate regulation
Beaches and Dunes	Net primary production	Disturbance Regulation
Saltwater Wetlands	Pollination and seed dispersal	Biological regulation
Nearshore Freshwater	Habitat	Water regulation
Wetlands	Hydrological cycle	Erosion Prevention
Kelp beds		Waste regulation
Nearshore Islands		Nutrient regulation
Cold Water Coral Reefs		Water supply
Sea Mounts	***Cultural services***	
Semi-Enclosed Seas	Recreation	
Open Ocean	Aesthetic	
Nearshore Ocean	Science and education	
Nearshore Open Space	Spiritual	

Figure 4.1. Irish Marine Ecosystem and their Non-Market Goods and Service

Evidence-based policy making should be supported by non-market valuations of ecosystems goods and services. Methodologies for calculating non-market values of ecosystems and services are still in their infancy but are being actively encouraged under new EU Directives and Policies, e.g. European Marine Strategy Framework Directive and guidelines for Maritime Spatial Planning.

Case Study: The Valuation of Ecosystem Services in Galway Bay

A benefit transfer exercise[12] was conducted by SEMRU in 2010 to estimate the value of the non-market ecosystem services provided within Galway Bay. The EU Water Framework Directive 'coastal waters guidelines' were used to provide the boundaries of the study site and GIS systems were used to map and aggregate the different types of coastal ecosystems. The service flows from four terrestrial ecosystem types (beaches, coastal lagoons, salt marshes and intertidal flats) and three marine ecosystem types (sea, estuaries and sea grasses) were valued.

The study found that a conservative estimate of the yearly non-market ecosystem services in Galway Bay was approximately €634 million (2007) and that the most valuable ecosystems per hectare were coastal lagoons and beaches. The highest valued services were eutrophication mitigation, sediment retention and recreation. Given this estimate is for a single bay area in Ireland, the total value of non-market goods and services from Irish marine ecosystems may very well be more that the total value of the marketed goods and services in Irelands Ocean Economy that have been analysed in this report

[12] Benefit transfer is a process of valuing a non-market good or service of a site (often called the policy site) by using values estimated for similar non-market services at another site (often called the study site) and applying these values to the policy site.

5. International Comparisons

The direct value of the ocean economy to Ireland in 2007 is estimated at **€1.44 billion** or approximately **1% of GDP**. The direct and indirect value was €2.4 billion.

International comparisons are extremely difficult as the 'marine/ocean' sector does not formally exist in most national accounts and figures currently available from European Member States and other countries (Table 5.1) are rarely directly comparable. In general, and similar to the case in Ireland, coastal tourism and marine transportation are the largest marine sectors in terms of both economic value and employment.

Table 5.1 International Comparisons

Country	Year	Marine Sector GVA *Value in €billion*	% National GDP	Indicative Employment *Source: European Atlas of the Seas Country Profiles*
UK*	2006	€67	4.2%	548,674
Germany**	2009	€50	2.1%	200,192
Norway†**	2009	€30+	1.2%	-
France*	2007	€28	1.5%	395,223
Ireland*	2007	€1.4	1%	17,000
Iceland†**	2008	€1+	8.0%	-
Belgium**	2006	-	9.5%	50,219
Denmark**	-	-	-	163,290
Netherlands**	-	€8.8	1.5%	113,319
Portugal**	2006	€2.3	2.0%	99,406
Spain**	-	-	3.2%	1,645,959
USA*	2004	€113	1.2%	-
Canada*	2000	€16	1.5%	-
Australia*	2003	€15	3.6%	-
New Zealand*	2002	€2	2.9%	-

**Figures from official national reports*
*** Figures from communications with national representatives*
†. Data for Norway and Iceland is only for the fisheries sector
A dash indicates data not available

Marine policy at the European level has been driving the collection of marine related economic activity by the EU Commission and individual member states. In 2006, work done in preparation for the Integrated Maritime Policy for the European Union (IMP-EU, 2007)[13] included:

- The preparation of Member State Country Profiles giving maritime facts and figures for all EU Member States[14];
- An assessment in each Member State of employment trends in all sectors related to the sea or using sea resources.

[13] European Atlas of the Seas: http://ec.europa.eu/maritimeaffairs/index_en.html
[14] Maritime Facts and Figures (2007) European Commission KL-75-06-396-EN-C. 11pp.

The resultant data can be accessed via the European Atlas of the Seas website (see footnote 13). In the report the EU Commission estimated that between 3 and 5% of Europe's GDP (2007) was generated from sea-related industries and services. Note, however, this figure does not include the value of raw materials such as oil, fish or gas.

In 2008, the EC also commissioned, as part of the Integrated Maritime Policy Action Plan, a number of studies aimed at improving national maritime and coastal statistics. The resultant studies (The Ifremer Study: Approach towards an Integrated Maritime Policy Database; The Sogeti Study: Description of the Sea and Coastal Areas in Europe), while assembling a comprehensive database and description of the contribution of the maritime economy to Member States economies, noted considerable difficulties in collecting comparable data for Member States and concluded that considerably work needed be done before reliable, comparative and regular data on the contribution of marine/maritime sector to Member State and European GDP could be compiled[15].

A number of countries, including Ireland, are now making renewed efforts to develop appropriate methodologies and routine data collection procedures that will support regular economic assessments of the contribution of the marine/maritime sector to National GDP. The most comprehensive assessments to-date have been carried out by France (IFREMER) and the UK (Crown Estate).

[15] https://webgate.ec.europa.eu/maritimeforum/node/498

Photography: David Branigan

6. Outlook for the Irish Marine Sector

The Future: With a relatively unexploited natural resource Ireland's marine sector has a positive future if the right steps are taken to develop this resource. Like the rest of the national SMART economy agenda, key to achieving this potential will be a transition to a knowledge-based high-value added sector. The drive towards a knowledge-based high-value added economy, already implemented in other economic sectors, such as pharmaceuticals and the agri-food sector, will allow the Irish ocean economy to increase productivity and should result in increased competitiveness across both established and emerging sectors. This is an objective not only for new sectors, but also via increased productivity of established sectors.

> *"The volume of goods passing through Irish ports increased across all the main shipping segments during the 3rd quarter of 2010 compared to the same period last year, with containerized exports up 12%".*
>
> *IMDO Quarterly Forecasts Q4/2010.*

Established Sectors: Given the severe public finance difficulties and the related weakness of domestic demand, building our export economy, will be vital to future economic growth. Progress in this regard is already visible in 2010, which despite the negative economic commentary in relation to the national economy had the highest export performance ever. As an island nation, underpinning this trade performance, particularly in the primary and manufacturing sectors is a vibrant maritime transport sector. Thus renewed growth in the shipping and maritime transport sector will depend to large extent on improvements in the global market. Rapid improvements in Ireland's cost competitiveness over the past two years have improved the outlook for tourism activity, which suffered substantially during the deep recession. Water-based tourism sectors are in a good position to benefit from this improved outlook but need to continuously monitor costs to maintain competitiveness and to ensure that product offerings continue to meet the needs of changing tourist demand.

The Department of Agriculture Fisheries and Food's (DAFF) Food Harvest 2020 Report (2010) has set ambitious targets for revenues from the fisheries sector aiming to increase output to €1bn, an increase of 40%, by 2020 while aquaculture output could increase by 78%. Growth in the seafood sector will depend on reforms of the Common Fisheries Policy, the rebuilding of fish stocks, our ability to use research and innovation to add value to the available resource base, improve competitiveness, reduce costs and introduce new value added products (e.g. functional foods).

Emerging Sectors: Significant potential lies in local and international markets in the medium to long term in sectors concentrating on new and emerging technologies, such as ICT and Life Sciences; areas where Ireland has established an international reputation and research capacity. The High-Tech Services, Marine Biotechnology and Marine Commerce, sectors whilst starting from a very low base, all have significant growth potential

Of the emerging sectors, Marine Renewable Energy (including offshore wind, wave and tidal energy) is potentially the most exciting of the new ocean industries. This is because of both our large natural resource base and the huge size of national and international markets for energy, combined with expected continuous rise in non-renewable energy sources. Ireland sits geographically in an ocean energy hotspot and could, along with other European Atlantic seaboard countries, become a very important future energy/electricity source for Europe. INDECON (2008), for example, suggest that delivering 500MW via offshore wind energy would add €4.3 billion to the Irish economy with an employment potential of between 300-500 individuals. According to the Sustainable Energy Agency of Ireland (SEAI), wave and tidal energy production and ancillary activities could add €1.3 billion/1,350 employees (pessimistic scenario) to €9 billion/>50,000 employees (optimistic scenario) to the Irish economy by 2030. There is thus a very significant potential for turnover, value added, employment and the creation of a suite of ancillary and support products and services. The development of the renewable ocean energy sector in Ireland would have significant downstream impacts on the marine high-tech services industry, the marine manufacturing, construction and shipping services and other benefits in terms of energy security (attractive to Foreign Direct Investment) and a reduction of CO2. Key to the development of this sector will be a support licensing regime and the development of cost effective mechanisms to harness the ocean's energy. Substantial research and development will be required to achieve this, but the potential returns could be enormous if achieved. Given the relative size of our marine resource, Ireland should aim to be at the forefront in developing these technologies, not only with the objective of harnessing our own energy, but also in developing export focused consulting and technology businesses to facilitate the development of ocean energy overseas.

Appendix I: Methodology and Data Sources

Methodology

The ocean economy is defined as the economic activity, which directly or indirectly uses the ocean as an input. Definitions of marine-based industries within this economy differ across countries. However, the general approach taken in this report when measuring the ocean economy was to:

1. Define the industries that are part of the marine or ocean economy
2. Identify the marine sub-sectors for which there is a publically available data (for example, sectors within national input-output tables
3. Estimate the proportion of economic activity that is marine-based
4. Record levels of turnover, employment, value-added, exports, etc for each industry that is in the marine sector

Certain marine sub-sectors are clearly identifiable within national input-output tables or national income and expenditure estimates, for example maritime transport or fishing. Data on other marine based activity can be difficult to obtain; for example, one cannot isolate marine-based tourism data from general tourism using the data collected by the Central Statistics Office (CSO). Therefore, certain sub-sectors require additional survey activity to ensure that all sub-sectors of the ocean economy are represented.

The general approach adopted in this report for assessing the marine sector has been concerned with production activity: net output/turnover, input, value added and employment. Where available, export data has also been included.

The CSO provides data on turnover, gross value added and employment for each sector within the Irish economy. This data is collected across a number of censuses and surveys. The CSO censuses and surveys used for the collation of the data on the marine sector include;

- The Census of Industrial Production (CIP), 2007
- The Annual Services Inquiry (ASI), 2007
- The Census of Buildings and Construction (CBC) , 2007

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 which groups companies according to their business activities. It assigns a unique 2, 3 and 4 digit code to each industry (for example, 15.20 – seafood processing). Table A.1 provides an overview of the marine sub-sectors and their data source.

Public data sources provided 82% of data on total marine turnover, 92% of data on total marine GVA and 79% of data on total marine employment.

A survey developed by SEMRU was administrated to enterprises in the marine sub-sectors when data on their representative sectors was not available in CSO datasets. This survey was similar to the surveys administrated by the CSO and contained questions on the enterprises annual turnover, purchases, employee levels, labour costs, investment among others. The companies surveyed were compiled using an updated listing of the Marine Institutes MIDI (Marine Industry Data Inventory) company database. A total of 450 surveys were collected. The marine sectors reviewed in this report correspond to those outlined in the Marine Institute's 2005 report 'Ireland's Ocean Economy & Resources'. The sectors defined are also consistent with those used in similar analyses in other countries. The main difference in this report compared to the 2005 Marine Institute Report arises in the definition of marine technology. In this report marine technology is included within the marine services sub-sector rather than the marine manufacturing sub-sector.

Marine Services	Data Source
Shipping	Annual Services Inquiry 2007
Port and Maritime Logistics	Annual Services Inquiry 2007
Water Based Activities	SEMRU Company Survey
Tourism Expenditure	ESRI Report (2003)
Cruise	UCC Report (2008)
High Tech Services	SEMRU Company Survey
Marine Commerce	SEMRU Company Survey
Other Services	SEMRU Company Survey
Marine Resources	
Fisheries	Sea-Fisheries Protection Agency 2007
Aquaculture	BIM Report 2007
Seafood Processing	Census of Industrial Production 2007
Retail	Annual Services Inquiry 2007
Seaweed	SEMRU Company Survey
Oil & Gas	Census of Industrial Production 2007
	SEMRU Company Survey
Marine Renewable Energy	SEMRU Company Survey
Marine Manufacturing (including Boat Building), Engineering and Construction	
Marine Manufacturing (including Boat Building),	Census of Industrial Production 2007
Engineering and Construction	Census of Building & Construction 2007
	SEMRU Company Survey

Table A.1 Overview of Marine Industries and Data sources

Data Sources

Fish Landings
- Output Value: Sea Fisheries Protection Authority (2007). Annual Report 2007, Clonakilty, Cork
- Trade: Central Statistics Office – Trade Exports Database 2007
- Employment: Central Statistics Office (2007). Quarterly National Household Survey, Q2, 2007, Cork
- GVA: Central Statistics Office (2008). National Accounts Output Value by Activity 2007, Dublin. (Coefficient for NACE code 05, Fishing and Aquaculture Activities).

Aquaculture
- Turnover: Bord Iascaigh Mhara (2007). The Status of Aquaculture 2007, Dublin
- Exports: Central Statistics Office – Trade Exports Database 2007
- Employment: Bord Iascaigh Mhara (2007). The Status of Aquaculture 2007, Dublin

Seaweed
- SEMRU Company Survey

Fish Processing
- Central Statistics Office (2009). Census of Industrial Production 2007, Cork.

Shipping and Maritime Transportation Logistics
- Central Statistics Office (2009). Annual Services Inquiry 2007, Cork

Overseas Tourism
- Expenditure: Failte Ireland estimated the number and expenditure of overseas visitors engaged in marine activities in 2003. We updated these figures for 2007 using Failte Ireland estimates of overseas visitors from 2004 through to 2007.
- Employment (both overseas and domestic tourism figures): Failte Ireland figures for employment in tourism (for example, employment in hotels, restaurants, entertainment, etc), inflated in line with overall employment figures for the sector from 2004 through to 2007[16].
- GVA: Central Statistics Office (2008). National Accounts Output Value by Activity 2007, Dublin. (Coefficient for NACE code 92, Recreational, cultural and sporting activities).

Domestic Tourism
- Expenditure: ESRI (2004) 'Participation in Marine-Based Activities in Ireland in 2003' figures have been updated to 2007 figures (adjusted using domestic tourism figures for the period 2004 to 2007 released by Failte Ireland)[17] .
- GVA: Central Statistics Office (2008). National Accounts Output Value by Activity 2007, Dublin. (Coefficient for NACE code 92, Recreational, cultural and sporting activities).

Water-Based Activities, Marinas, and Marine Attractions
- SEMRU Company Survey

[16] To avoid double counting, employment in attractions and activities was omitted in 2007, as marine based employment in this sector had been generated by a company survey and outlined above.
[17] The expenditure figures corresponding to 'other expenditure' in the ESRI Report was not included in these estimates, as double counting would arise in terms of the payments to water-based sports providers, sea-angling, and marine attractions and resources accounted for in the SEMRU Company Survey.

International Cruise
- Expenditure Levels: Maloney, R and Ward, A. (2008). Economic Contribution of the Port of Cork to the Irish Economy, UCC Report.
- Number of Calls to Irish ports: Central Statistics Office (2009). Transport Statistics 2007, Cork.
- GVA: Central Statistics Office (2008). National Accounts Output Value by Activity 2007, Dublin. (Coefficient for NACE code 92, Recreational, cultural and sporting activities).

Oil and Gas Activity
- Turnover: Central Statistics Office (2009). Census of Industrial Production 2007, Cork.
- Gross Value Added: Central Statistics Office (2009). Census of Industrial Production 2007, Cork.
- Employment: SEMRU Survey

Renewable Energy
- SEMRU Company Survey

Water Construction
- Central Statistics Office (2009). Census of Buildings and Construction 2007, Cork.

Boat Building
- Central Statistics Office (2009). Census of Industrial Production 2007, Cork.

Marine Manufacturing and Engineering
- SEMRU Company Survey

High Tech Marine Services
- SEMRU Company Survey

Marine Commerce
- SEMRU Company Survey

Other Services
- Chandlery & Boat Sales: Irish Revenue Data
- Ship Surveyors: SEMRU Company Survey

Figures for Internationl Comparisons
- Allen Consulting (2004). The economic contribution of Australia's marine industries: 1995–96 to 2002–03: A report prepared for the National Oceans Advisory Group. The Allen Consulting Group Pty Ltd, 2004.
- Crown Estate (2008). Socio-Economic indicators of marine-related activities in the UK economy 60pp.
- IFREMER (2009). French Marine Economic Data 2009. 120pp.
- Kildow, J.T, Colgan, C.S. and Scorse, J. (2009). State of the U.S. Ocean and Coastal Economies 2009. National Ocean Economics Program
- NZ Stats (2006). New Zealand's Marine Economy 1997 to 2002. An experimental series report by statistics. New Zealand Stats, New Zealand.
- RASCL (2003). Canada's ocean industries: contribution to the economy 1988–2000. Ottawa, Ontario K1V 1K8, September 2003.

Appendix 2: Gross Value Added by Industry Code

Gross Value Added (€ Million) by Industry in 2007 (NACE Code in brackets)

NACE Industry	Gross Value Added at Basic Prices	Percentage of Total GDP
Agriculture, hunting and related service activities (01)	2561	1.5
Food products and beverages (15)	6439	3.8
Publishing, printing and reproduction of recorded media (22)	4286	2.5
Chemicals and chemical products (24)	12453	7.4
Radio, television and communication equipment and apparatus (32)	2168	1.3
Medical, precision and optical instruments, watches and clocks (33)	2999	1.8
All construction (45)	16204	9.6
Wholesale trade (51)	8990	5.3
Retail trade (52)	6577	3.9
Hotels and restaurants (55)	3955	2.3
Land transport (60)	1999	1.2
Post and telecommunications (64)	3054	1.8
Financial intermediation, except insurance and pension funding (65)	10942	6.5
Insurance and pension funding except compulsory social security (66)	4145	2.5
Other financial intermediation (67)	2674	1.6
Real estate activities (70)	13167	7.8
Renting of machinery and equipment without operator and of personal and household goods (71)	4084	2.4
Computer and related activities (72)	5082	3.0
Other business activities (74)	8883	5.3
Public administration and defence, compulsory social security (75)	7191	4.3
Education (80)	7535	4.5
Health and social work (85)	11748	6.9

Source: CSO

Note that percentages do not add up to 100 as sectors less than 1% of GDP have been excluded.

Photography: Fiona Watson

Socio-Economic Marine Research Unit
National University of Ireland, Galway

Tel: +353 (0)91 493105
Fax: +353 (0)91 524130
email: stephen.hynesnuigalway.ie
web: http://www.nuigalway.ie/semru/

NUI Galway
OÉ Gaillimh

semru
Socio-Economic Marine Research Unit

ISBN-13: 978-0-9546815-6-2

9 780954 681562