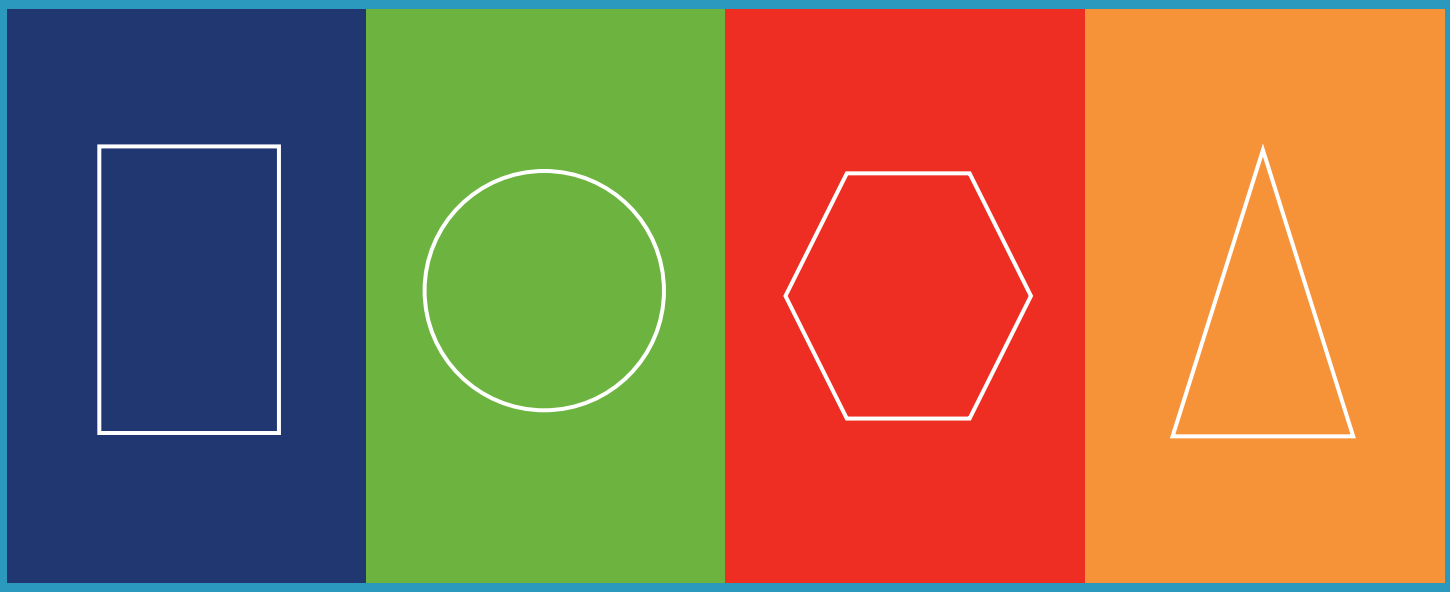


A Study of the Current and Future Skills Requirements of the Marine/ Maritime Economy to 2020

April 2015

Expert Group on
Future Skills Needs

Table of Contents

Introduction to the Expert Group on Future Skills Needs

The Expert Group on Future Skills Needs (EGFSN) advises the Irish Government on current and future skills needs of the economy and on other labour market issues that impact on Ireland's enterprise and employment growth. It has a central role in ensuring that labour market needs for skilled workers are anticipated and met.

Established in 1997, the EGFSN reports to the Minister for Education and Skills and the Minister for Jobs, Enterprise and Innovation.

The EGFSN Secretariat is a unit in the Strategic Policy Division of the Department of Jobs, Enterprise and Innovation (DJEI) and in conjunction with the Skills and Labour Market Research Unit (SLMRU) in SOLAS provide the Expert Group with research and analysis support.

Acknowledgements

The EGFSN Secretariat would like to record its appreciation to the members of the Steering Group, who oversaw the progress and the development of this report, for their significant commitment and contribution – the membership is set out in Appendix 5.

The EGFSN Secretariat would like to thank the many industry executives, academics and staff at expert organisations and State Agencies who gave their valuable time and insights through interviews and at workshops.

The EGFSN Secretariat would like to acknowledge the work of the consortium comprising RSM McClure Watters (Leading), Dr Paul Brewster of Pure Marine Gen Ltd., Matt Rooke of PACEC (now part of RSM McClure Watters) and SEMRU (Socio Economic Marine Research Unit) of NUIG. The EGFSN would also like to thank the Marine Institute for their support and for making their photographs available for inclusion in the report.

Foreword

Our ocean wealth is a national asset, supporting a diverse marine economy, with vast potential to tap into a €1,200 billion global marine market for seafood, tourism, oil and gas, marine renewable energy and new applications for health, medicine and technology. *Harnessing Our Ocean Wealth - an Integrated Marine Plan for Ireland, (HOOW)*, sets out a roadmap for the Government's vision, high-level goals and integrated actions across policy, governance and business to enable our marine potential to be realised. One such action was to "Identify future skills needs and labour market supply and demand trends in the marine/maritime area in the context of *Harnessing Our Ocean Wealth*".

Under the *Government Action Plan for Jobs 2014*, the Expert Group on Future Skills Needs (EGFSN) committed to undertaking this assessment of the profile and diversity of the occupations and skills requirements of enterprises in the different sectors that make up the Marine economy. The overarching aim of this study is to ensure that the right skills base will be available to meet the needs of enterprises in the developing Marine Economy out to 2020.

The focus of the EGFSN study is on those sectors of the marine economy which have been identified by HOOW as key sectors which contribute to the Irish Marine Economy, namely; Seafood and Bio-Products; Maritime Transport, Shipbuilding and Services; Energy; Marine Tourism; and Maritime Monitoring, Security and Surveillance.

The 2014 employment estimate across the entire marine economy is 16,155 full-time equivalents (FTEs). The demand forecast analysis indicates that, due to the anticipated expansion and replacement demand some 16,915 job vacancies could become available over the period 2015-2020. The expansion component of this demand is forecast to be 10,138 FTE jobs, of which 4,928 jobs are forecast in the maritime transport, shipbuilding and services (MTSS) (driven primarily by the proposed International Shipping Services Centre) with marine tourism following with 3,447 new jobs, reflecting the upturn in the global economy and the return of foreign tourists.

No major skills shortage currently exists but in the seafood sector in particular, the workforce is ageing and this will present a skills difficulty unless measures are put in place to attract and upskill younger workers. While operatives and low skill roles are a major component of the Marine Economy there is evidence of a shift toward more professionals being employed in sectors such as seafood which is predominantly a low skill employer and the emerging sectors, such as marine renewable energy and maritime monitoring where professionals such as engineers is the major skill in demand.

A key finding in the study is the lack of awareness about possible careers in the Marine Economy and the time delay in obtaining current economic data for the marine economy.

I would like to express my thanks to all those who contributed to the report. Particular thanks are due to the many industry executives, academics and professionals who contributed their valuable time and expertise. I would like to thank Dr Brendan Murphy who chaired the Steering Group that oversaw the completion of the report and to each member of the Steering group for their commitment and sharing of expertise. Finally, I would like to thank the EGFSN Secretariat for their research and analysis input and managing this project to a successful conclusion.

Una Halligan

Una Halligan
Chairperson, Expert Group on Future Skills Needs

Executive Summary

Courtesy of photographer Tomasz Szumski

E.1 Introduction

This report, *A Study of the current and future skills requirements of the Marine/Maritime Economy to 2020* was undertaken by the Expert Group on Future Skills Needs (EGFSN) to assess the profile and diversity of the occupations and skills requirements of enterprises in the different sectors that make up the Marine/Maritime Economy and to propose recommendations to ensure the right skill base to meet the enterprise needs.

In the context of this study the Ocean Economy and the Marine and/or Maritime Economy are used interchangeably and the terms Marine and Maritime are sometimes used together or individually. Irrespective of the term used, it means "**all** activities relating to the sea" unless otherwise specified.

The Ocean or (Marine/Maritime) Economy is defined as "*Economic Activity that indirectly or directly uses the marine as an input*"[1]. The number of sub-sectors associated with the Marine/Maritime economy is vast and each of these in turn is interlinked and also interacts with other sectors outside the marine area. The sub-sectors of the ocean economy can be grouped in many different ways, e.g., established markets and emerging markets; or mature, growth and pre-development stage; or services, resources and manufacturing.

For the purposes of this study it has been decided to group the complex web of maritime economic activities around five marine sectors, namely:

1. Seafood and Bio-Products;
2. Maritime Transport, Shipbuilding and Services;
3. Energy;
4. Marine Tourism; and
5. Maritime Monitoring, Security and Surveillance.

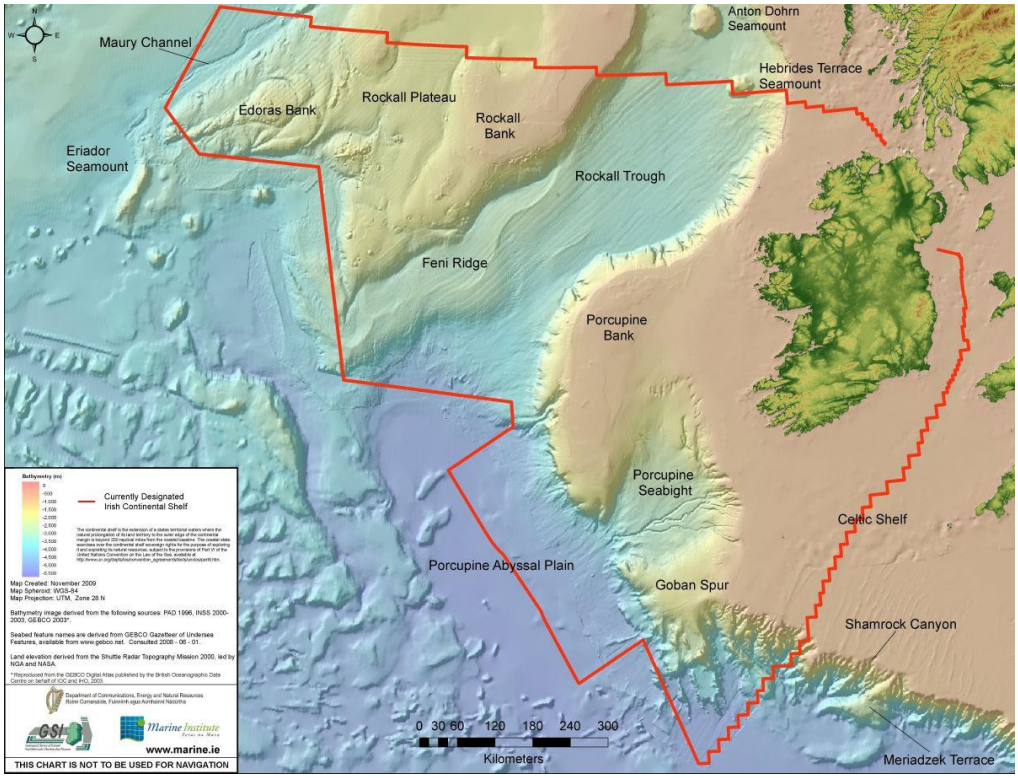
[1] Source: Harnessing Our Ocean Wealth - An Integrated Marine Plan for Ireland. 2012

Background

Taking our seabed area into account, Ireland is one of the largest EU states; with sovereign or exclusive rights over one of the largest sea to land ratios (over 10:1) of any EU State (Figure E1). Our coastline of 7,500km is longer than that of many European countries and yet this is a resource we often overlook.

Our ocean is a national asset, supporting a diverse marine economy, with vast potential to tap into a €1,200 billion global marine market for seafood, tourism, oil and gas, marine renewable energy, and new applications for health, medicine and technology. In 2010, (the latest year for which data is published), Ireland generated 1.2% of GDP (€2.4bn direct and indirect Gross Value Added (GVA)) from its ocean economy, supporting about 1% of the total workforce. Global marine economic activity is estimated to contribute 2% of the world's GDP and the European Commission estimates that between 3% and 5% of Europe's GDP was generated from sea-related industries and services in 2007.

Figure E1: The Real Map of Ireland



© Marine Institute and the Geological Survey of Ireland

In 2012 the Government launched Harnessing Our Ocean Wealth– an Integrated Marine Plan for Ireland (HOOW) [2]. This Integrated Marine Plan:

- sets out a roadmap for the Government's vision, high-level goals and integrated actions across policy, governance and business to enable our marine potential to be realised;
- provides a new momentum for growth in the marine area; and
- seeks to ensure that all nine government departments with responsibility for a marine activity work together more efficiently and effectively on the diverse issues related to the marine.

[2] http://www.ouroceanwealth.ie/Pages/default.aspx

Under the *Government Action Plan for Jobs 2014*, the Expert Group on Future Skills Needs (EGFSN) EGFSN was tasked with undertaking a detailed assessment of "the future skills needs and labour market supply and demand trends in the marine/maritime area in the context of the targets set in Harnessing Our Ocean Wealth". The overarching aim of this study is to ensure that the right skills base will be available to meet the needs of enterprises in the developing Marine Economy out to 2020.

The vision and goals set out in HOOW have been framed within the context of what is happening at the broader global and EU levels recognising the contribution the marine economy can make to global economic growth and the need for appropriate policies, strategies and funding mechanisms to enable this. In particular in 2007, following a Europe wide consultation process, the Commission took a landmark decision to establish a Directorate General for Maritime Affairs[3] (DG MARE); and to publish an Integrated Maritime Policy for the European Union (IMP-EU) and an associated Action Plan[4].

© Fáilte Ireland and Tourism Ireland

The Ocean Economy

The marine economy in Ireland was been identified as having the potential to grow substantially in the next few years and therefore create employment for residents of Ireland directly and indirectly.

The Socio Economic Marine Research Unit (SEMRU) in NUIG (National University of Ireland Galway) undertook the extensive task of data collection and analysis of Ireland's ocean economy. Marine socio-economic data are not readily available in Ireland (nor indeed in the other European countries) primarily because the economic profile of the ocean economy is not distinct from other aspects of the broader economy. Only a proportion of the NACE Codes[5] relate solely to a maritime activity with the majority being only partially relevant. A list of the NACE codes relevant to the Ocean economy is in Appendix 2 of the full report[6].

This study assessed the skills needs of the ocean economy across five marine sectors each with a number of sub-sectors. Table E1 provides some key economic indicators for each subsector, namely Direct Employment (FTE), GVA (€millions) and Turnover (€millions). This data is the 2010 data, the latest available, but it gives an indication of the size of the economy and the numbers employed.

[3] http://ec.europa.eu/dgs/maritimeaffairs_fisheries/index_en.htm
[4] http://ec.europa.eu/maritimeaffairs/policy/index_en.htm
[5] NACE Code is a Statistical classification of economic activities in the European Community. http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(NACE)
[6] www.skillsireland.ie

Table E1: Direct Employment (FTE), GVA and Turnover for subsectors within the Marine Economy

Sector Sub-sector	Direct Employment (FTE)	GVA (€millions)	Turnover (€millions)	National Strategy/ Targets
Seafood and Bio-Products	**5,633**	**256**	**745**	
Sea Fisheries	2,825	116	202	FH(Food Harvest) 2020 - Target 14,000 FTE (from 11,000) Turnover target - €1billion from €0.7b
Marine Aquaculture	918	47	123	
Seafood Processing	1,586	80	390	
Marine Biotechnology and Bio-Processing	304	13	30	
Maritime Transport, Shipping and Services	**5,689**	**540**	**1,658**	
Shipping and maritime transport	4,633	422	1,422	HOOW Turnover Target >€1.2b (derived from baseline level of activity as measured by SEMRU – Ireland's Ocean Economy
Marine Retail Services	252	34	58	
Marine Manufacturing, Construction and Engineering	726	44	111	
Marine Commerce and Ship Leasing	78	40	67	IMDO Turnover €2.6b for Marine Commerce and Ship leasing
Energy	**1,077**	**65**	**138**	
Oil and Gas Exploration and Production	861	61	126	
Marine Renewables – Offshore wind, Wave and Tidal	216	4	12	
Tourism	**3,502**	**337**	**858**	
Marine Tourism and Leisure	3,502	337	841	HOOW Turnover Target: €1.5b
International Cruise Industry	N/A	N/A	17	
Maritime Monitoring, Security and Surveillance	**391**	**21**	**56**	
High-tech marine products and services	391	21	56	>€61m projected turnover- based on 2007 SEMRU company survey
Total	**16,292**	**1,219**	**3,455**	

Source: SEMRU, Ocean Economy Report 2013 (Reference year: 2010)

Jobs in the Ocean Economy

The marine economy offers a wide and diverse range of career opportunities. The types of jobs found in each of the sectors are detailed in Appendix 3 of the full report. The occupations within the ocean economy are distributed across all levels: management (including specialist management functions), professionals (including engineers, scientists); associate professionals (e.g. technicians), operatives (riggers, deck hands); sales and elementary occupations and reflect the diverse educational requirements: Higher (HE) and Further Education and Training (FET); Leaving Certificate; Junior Certificate and No Formal Qualifications.

Increasingly more complex technical projects and opportunities offered by convergence in the marine sector mean that far greater interdisciplinary knowledge and experience of working in multi-disciplinary environments is and will continue to be required. It will mean bringing together professionals from diverse backgrounds - such as engineers, planners and architects with ecologists, biologists, and chemists.

© Marine Institute - Photographer Paul Kaye

The marine economy, both nationally and globally, has a requirement for technicians and general operatives as well as highly skilled technical staff and professionals. The core skills and knowledge of these occupations, e.g. electricians, metal workers and mechanical engineers, are relevant to both land and sea based roles and as such are transferable. The land-based skills can be "marinised" to deal with the challenges of working in an off-shore and/or a marine environment.

E.2 Methodology

Phase 1 – Assessing the current profile and diversity of skills

The objective of Phase 1 was to assess the profile and diversity of the current skills and occupations and the skills supply and demand of the marine economy for all five sectors and their sub-sectors, as listed in Table E1, and to assess qualitatively the anticipated future needs of enterprises within the marine economy.

This phase of the research comprised four main elements:

1. Desk review of relevant government policies, economic profile and data on education/skill levels within each subsector;
2. Telephone interviews were conducted, using a structured questionnaire format, with 60 maritime enterprises from across the ocean economy taking into account the size of company, ownership (foreign/indigenous) and stage of development (start-up/mature);
3. Interviews were undertaken with stakeholders from the key Government departments, development agencies, education providers, industry associations and other organisations involved in the marine economy to ascertain their views on the current and anticipated skills demand and how these skills requirements may best be met; and
4. Four thematic workshops were facilitated with selected companies and key stakeholders.

Phase 2 - Future Demand Scenarios

Phase 2 involved forecasting the future demand for skills in the ocean economy. The most recent official data is that provided by SEMRU (Socio-Economic Marine Research Unit in NUIG). Their first Ocean Economy Report, published in 2010, was based on the reference year 2007, at the height of the economic boom (2003 – 2007). The latest report, with a reference year of 2010 and published in 2013, represents the lowest point of the economic contraction (2007 – 2010) with a significant decrease in activity, particularly in the shipping and maritime transport sector and in water based construction. A comparison between 2007 and 2010 data saw a 25.4% decrease in turnover, a 20.9% fall in employment and a 29.7% decrease in direct GVA[7].

In order to develop forecasts of the future skills demand to 2020 it was necessary that baseline estimates for 2014 be produced[8]. This was done using additional sources of information, such as: annual CSO (Central Statistics Office) employment trend data for broad sectors; Economic and Social Research Institute (ESRI) Medium Term Review (MTR) 2013 – 2020 and SOLAS Occupational Employment Projection 2020 (Jan 2014); results from company surveys; and discussions with stakeholders. The outcome from this exercise is shown in Table E2.

Table E2: 2007 and 2010 FTE Employment and 2014 Baseline FTE Estimates for the Ocean Economy

Sub-sector	2007‡	2010‡	2014*
Total - Seafood and Bio-Products	**5,615**	**5,633**	**5,359**
Sea Fisheries	2,200	2,825	2,513
Marine Aquaculture	1,061	918	918
Seafood Processing	2,090	1,586	1,586
Marine Biotechnology and Bio-Processing	264	304	342
Total - Maritime Transport, Shipbuilding and Services	**7,895**	**5,689**	**5,689**
Shipping and maritime transport	5,903	4,633	4,633
Marine Retail Services	287	252	252
Marine Manufacturing, Construction and Engineering	1,600	726	726
Marine Commerce and Ship Leasing	105	78	78
Total - Marine Renewable Energy	**891**	**1,077**	**1,148**
Offshore Oil and Gas	790	861	861
Offshore Renewables	101	216	287
Marine Tourism and Leisure	**5,836**	**3,502**	**3,502**
High-tech marine products and services	**350**	**391**	**457**
Total Marine Economy	**20,587**	**16,292**	**16,155**

‡: SEMRU Data from "*Ireland's Ocean Economy*", Ref Year 2007, (2010) and Ref year 2010 (2013)

*: 2014 baseline estimates, developed by PACEC, based on the 2010 SEMRU data

[7] SEMRU – Ireland's Ocean Economy. –Dec 2013.
http://www.nuigalway.ie/semru/documents/irelands_ocean_economy_report_series_no2.pdf

[8] The 2014 employment estimates were based on the SEMRU 2010 data which was the latest available data at the time. SEMRU are currently updating the 2010 data and will publish the 2012 figures later in 2015. The SEMRU publication will also present 2014 estimates but based on 2012 data.

The demand for skills arises from two sources, namely:

- Expansion Demand: additional employment owing to growth in the sector; and
- Replacement Demand: the replacement of workers arising from exits to inactivity and net losses from inter-occupational movements.

© Marine Institute - Photographer Cushla Dromgool Regan

Scenario 1 for each sector assumed that the turnover targets set out in HOOW would be met by 2020. Consultations with industry stakeholders, informed by the economic background data gathered, were used to determine how this increase in turnover could be achieved, how the additional turnover would be distributed between the various sub-sectors and how employment would need to increase in order to generate this turnover. A modelling exercise was then conducted using the information from the company interviews to estimate how the expansion demand would be distributed by occupational level in each sub-sector over the period 2014-2020. An estimation of the replacement demand was also conducted using data provided by the SLMRU (Skills and Labour Market Research Unit, SOLAS) and following the methodology used by them in the publication of the EGFSN National Skills Bulletin[9] on the exits from employment to economic inactivity and net losses from inter-occupational movements, which vary by occupation.

An alternative scenario, **Scenario 2**, representing a no-growth scenario for Seafood and Bio-Products and a higher growth scenario for Energy were also developed. The no-growth scenario was driven by lack of expansion in the aquaculture sub-sector and the high growth scenario was driven by growth in the energy sector, in particular marine renewable energy.

For each of the five sectors the distribution of the future skills demand by occupation is presented in Tables E3 - E7. The first column shows the distribution of the 2014 baseline estimate of Full-Time Equivalent (FTE) employees across the occupations. The second grouping sets out the expansion demand by occupation expressed as the actual number and as a percentage of the 2014 baseline estimate. The next set of columns presents the replacement demand while the final set of columns present the gross demand, i.e. the expansion plus the replacement demand.

In addition to the initial telephone discussions and consultations with key stakeholders in Phase 1, follow-up consultations were conducted to validate the outcome of the forecasts of the future skills demand.

[9] http://www.skillsireland.ie/media/23072014-National_Skills_Bulletin%20_2014--Publication.pdf

E.3 Seafood and Bio-Products

The sub-sectors assessed under this sector area:

- Sea Fisheries
- Marine Aquaculture
- Seafood Processing
- Marine bio-technology and bio-processing

Economic Profile

In 2010, the Irish Seafood and Bio-Products sector had an estimated annual sales value of €745 million and the Department of Agriculture believe that the potential exists to increase revenue to €1 billion by 2020[10] [11].

Table E1 shows that GVA for the Seafood and Bio-Products sector in 2010 was €256 million while turnover was €745 million. In addition, direct employment was 5,633 FTEs; however this figure rises considerably if indirect employment is taken into consideration.

© Marine Institute - MRI Carna research facility. Photographer David Branigan

Company Interviews

For the study 15 companies were interviewed from the Seafood and Bio-Products sector with a total of 798 employees which constitutes 15% of the total number of employees in the sector (5359).

Over the previous three years these companies have seen their greatest expansion in the Administrative, Professional and Management Occupations (40%, 33%, 30% respectively), although the numbers are small at 15, 12, 18 respectively. Over the next six years these companies anticipated a continued expansion for these occupations, in particular for Professionals with a 58% expansion (28 persons).

[10] Food Harvest 2020- A vision for Irish agri-food and fisheries. http://www.agriculture.gov.ie/agri-foodindustry/foodharvest2020/

[11] Harnessing Our Ocean Wealth: An Integrated Marine Plan for Ireland (2012) - http://www.ouroceanwealth.ie/Pages/default.aspx

Over the last three years six of the 15 companies saw an increase in their turnover while another six had a decrease in turnover with three indicating their turnover had not changed. By contrast over the next six years only two of the companies anticipated a decrease in turnover while seven anticipated an increase and six expected it to stay the same. The companies also indicated that on average over the last three years 67% of their turnover was from exports.

Currently, the majority of companies do not find skills or qualifications difficult to source. Where difficulties do exist, such as, onshore operatives and boat handlers, it was because they were not readily available in the local/rural area. This need could be met by the local Education and Training Boards (ETBs) in conjunction with Bord Iascaigh Mhara (BIM) which provides the Further Education and Training for the Seafood sector. In aquaculture, there are increased demands for energy and environmental monitoring, linked to new EU regulations which require up-skilling of professionals.

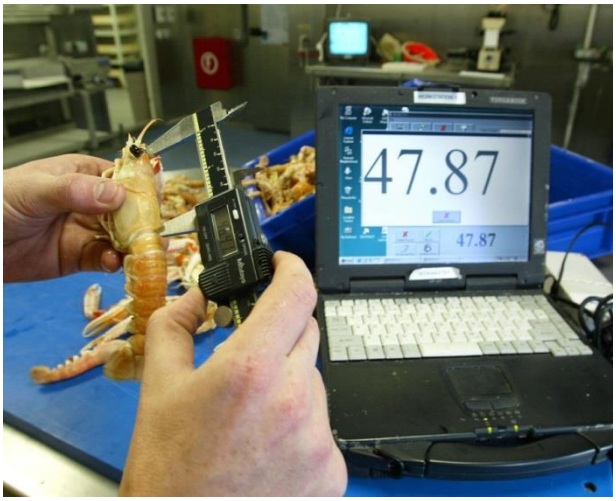
Stakeholder Consultation

A number of skills issues were identified during the stakeholder consultation. The first of these was the ageing workforce, in particular for the sea-fisheries sub-sector and the second related to the new export markets which would require greater language and international sales, marketing and business skills. In addition it was identified that fisherman, with appropriate training, are in an ideal position to provide data for scientists through sample collection and data measurement.

Future Demand for Skills 2015 - 2020

Scenario 1 assumes that the turnover target of an increase from €745mn to €1bn as set out in Harnessing Our Ocean Wealth will to be met by 2020.

It forecasts an expansion demand of 1,423 jobs increasing employment from 5,359 in 2014 to 6,782 full-time equivalent jobs by 2020. The replacement demand is 2,094 FTEs thereby giving rise to a gross demand of 3,517 which is 66% of the current work force. The distribution of the expansion and replacement demand by occupation level is shown in Table E3.



© Marine Institute. Sampling and Data Collection

The overall HOOW target of €1bn turnover by 2020 was driven by an increase in aquaculture production of 80,000 tonnes which was the target set in Food Harvest 2020. The evidence from the stakeholder consultations was that this aquaculture production target is very challenging and is unlikely to be realised by the 2020 timeline.

Therefore a second no-growth scenario was developed, **Scenario 2**, which forecast that employment over the seafood and bio-products sector would remain constant in all sectors over the period 2014-2020. In this no-growth scenario, the only driver of skills demand will be the replacement demand of 2,083 employees. The replacement demand for Scenario 1, the high growth scenario, is marginally higher than in Scenario 2, the no-growth scenario, simply because the sector is bigger. For Scenario 2 the replacement demand is equivalent to the gross demand.

Table E3: Distribution of Expansion and Replacement Demand to 2020 by Occupation in the Seafood and Bio-Products Sector

	2014 estimates	Expansion Demand Scenario 1 HOOW Target met		Expansion Demand Scenario 2 - HOOW Target NOT met	Replacement Demand Scenario 1 HOOW Target met		Replacement Demand Scenario 2 - HOOW Target NOT met	Gross Demand Scenario 1 HOOW Target met	
Occupation Level	**Baseline**	**No.**	**% of 2014**	**No.**		**% of 2014**	**No.**	**No.**	**% of 2014**
Operative Grades	3,043	514	17%	0	1,296	43%	1,328	1,810	59%
Administration	392	180	46%	0	179	46%	166	359	92%
Skilled Trades	934	237	25%	0	344	37%	341	581	62%
Associate Professional and Technical	45	0	0%	0	10	22%	11	10	22%
Professionals	365	373	102%	0	129	35%	100	502	138%
Management	580	119	21%	0	136	23%	137	255	44%
Total	**5,359**	**1,423**	**27%**	**0**	**2,094**	**39%**	**2,083**	**3,517**	**66%**

Source: PACEC, 2014

Supply-side Information

Bord Iascaigh Mhara (BIM) is the national agency with responsibility for training in the seafood sector. It has dedicated facilities through the National Fisheries College of Ireland (NFCI) at Greencastle, Co. Donegal and at Castletownbere in Co. Cork. BIM's courses cover a variety of disciplines including: Fishing – Skipper and Crew; Aquaculture; Processors and Retailers and Sea Safety training. Many courses are run in conjunction with the Education and Training Boards (ETBs). Courses range from three days to six months and are provided at NFQ (National Framework of Qualifications)[12] Levels 3-6.

Skillnets funds and facilitates training through networks of private sector companies, in a range of sectors and regions. Each network delivers training that is driven by specific industry and member company needs. The Taste 4 Success Skillnet runs two short courses namely: an Introduction to Fish Handling Skills and Smoking Fish.

Higher Education degree courses, at both undergraduate and postgraduate (NFQ Levels 7 – 10) which are "Marine" focussed and would provide a sound basis for moving into the broad Seafood and Bio-Products sector are predominantly taught in GMIT (Galway, Mayo Institute of Technology) and NUIG (National University of Ireland – Galway) with courses also available in QUB (Queen's University Belfast) and UU (University of Ulster – Coleraine).

[12] The National Framework of Qualifications (NFQ) is a ten-level system giving an academic or vocational value to qualifications obtained in Ireland. QQI (Quality and Qualifications Ireland) is Ireland's guardian of the NFQ system. http://www.qqi.ie/Pages/National-Framework-of-Qualifications-(NFQ).aspx

E.4 Maritime Transport, Shipbuilding and Services

The sub-sectors assessed under this sector are:

- Shipping and maritime transport
- Marine Retail Services
- Marine Manufacturing, Construction and Engineering
- Marine Commerce and Ship Leasing

Economic Profile

Economic indicators for the Maritime Transport, Shipbuilding and Services sector are outlined in Table E1. GVA in 2010 was €540 million, turnover was €1,658 million and direct employment was 5,689 FTE. Turnover decreased between 2007 and 2010 by 37.6%, with a 41.9% decrease in exports and a 28% decrease in employment in the same period.

© Marine Institute, Dublin Port 2014.

Shipping and Maritime Transport is by far the largest sub-sector within this sector with 4,633 FTEs directly employed which constitutes 81% of the entire grouping. The majority of shipping and maritime services activity occurs around the nine State commercial ports: Tier 1 - Dublin; Cork; Shannon-Foynes; Tier 2 - Waterford; Rosslare[13] [14]; Regional -Drogheda; Dun-Laoghaire; Galway; New Ross; and Wicklow.

By contrast Marine Commerce, which deals with the legal and financial services, insurance and ship leasing is a very small sub-sector with a turnover of €67 million and 78 FTE directly employed. That said, however, international ship leasing and charter operations are one of the fastest growing segments of the maritime services cluster and HOOW has set an ambitious target for an increase in turnover to €2.6 billion[15] in maritime commerce and ship leasing by 2020. While this is an ambitious target, on-going work by the Irish Maritime Development Office (IMDO) and the IDA regarding a proposed International Shipping Services Centre (ISSC) in Dublin could deliver a significant aspect of this growth. It is expected that such a hub would attract firms involved in shipping, ship leasing, shipping finance and operations management[16].

[13] National Ports Policy, – Iarnrod Eireann operates Rosslare Europort under a complex ownership involving Fishguard port that dates to the 19th Century http://www.dttas.ie/sites/default/files/node/add/content-publication/National%20Ports%20Policy%202013.PDF

[14] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013

[15] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013The ship leasing component of this target is included in shipping and maritime transport in this report, and cannot be disaggregated due to data confidentiality

[16] http://www.imdo.ie/IMDO/business/maritime-development/ISSC+Dublin.htm

Company Interviews

For the study 17 companies were interviewed from the Maritime Transport, Shipbuilding and Services sector with a total of 531 employees which constitutes 9% of the total number of employees (5,689) in the sector.

© Fáilte Ireland and Tourism Ireland

Over the previous three years these companies have experienced a decline in employment of 16% for operative grades but for professional occupations employment increased by 24%. Over the next six years these companies anticipated that the largest employment growth would be for administrative occupations at 54% closely followed by the professional occupations at 49% and operatives at 40%.

Over the last three years 10 of the 17 companies saw an increase in their turnover while another four had a decrease in turnover with three indicating their turnover had stayed the same. By contrast over the next six years only one of the companies anticipated a decrease in its exports while ten anticipated an increase and six expected them to stay the same. The companies also indicated that on average over the last three years 43% of their turnover was from exports.

Approximately 50% of the companies interviewed had difficulty finding people in their local area with the right level of experience and/or skills for Associate Professional and Technical occupations and 82% of companies had roles which they found were difficult to recruit into, such as: ships captains; marine engineers; hydrographic surveyors; marine electricians; marine planners; and welders.

Stakeholder Consultation

The main employment in this area of the ocean economy currently centres on the Irish ports, of which three have been categorised in the National Ports Policy as "Ports of National Significance (Tier 1)" namely: Dublin Port Company, Port of Cork Company and Shannon Foynes Port Company[17]. Each port is individually responsible for 15% to 20% of overall tonnage through Irish Ports. The ports companies themselves have relatively small numbers employed, with around 300 FTE employees between the three Tier 1 ports. Even though vacancies do not come up regularly, specialist skills can be difficult to find, for roles such as harbourmaster and berthing master. These positions are often filled by former merchant seafarers or naval officers. The majority of the occupations are at operative level but as port activities grow, there could be skills issues due to a lack of maritime training and experience of operatives.

The consultations highlighted a lack of awareness among school leavers about career options in the maritime sector and a lack of basic maritime knowledge combined with work experience in a maritime environment presented employers in the Maritime Transport, Shipping and Services sector with difficulty finding people with the right mix of skills and experience.

[17] http://www.dttas.ie/sites/default/files/node/add/content-publication/National%20Ports%20Policy%202013.PDF

The proposed international shipping services centre (ISSC) is a major project likely to impact on employment in the maritime transport area with a phased build up to accommodate over 100 maritime companies and creating over 3,500 jobs, employing engineers, ex-captains and specialists in ship broking/chartering, maritime law and finance, crew management, logistics and freight. These maritime companies will need skills where business experience is combined with maritime knowledge. One approach to addressing this is to recruit ex-mariners and focus their training on business skills, or alternatively "marinise" the business skills.

© Marine Institute, Dublin Port 2014

Future Demand for Skills 2015 - 2020

Estimating the baseline figure for 2014 for this large and diverse subsector was challenging. All the subsectors of the Maritime Transport, Shipping and Services lost substantial employment between 2007 and 2010, and this decline may not have ceased in 2010. However, the results of the interviews with companies suggested that many had increased employment and turnover over the last three years, and the stakeholder consultations revealed ongoing plans for investment to regrow the sector. The consensus view of stakeholders was that for the sector as a whole the best estimate was that employment was likely to be equal to the 2010 level.

Scenario 1 assumes that the targets of an increase in turnover to €2.6 billion[18] in maritime commerce and ship leasing as set out in Harnessing Our Ocean Wealth will to be met by 2020. While this target is ambitious the conclusion was that the increase in turnover will be driven by the ship leasing component of the shipping and maritime transport sector, i.e. the proposed International Shipping and Services Centre (ISSC).

The scenario forecast an expansion demand of 4,928 jobs increasing employment from 5,689 in 2014 to 10,617 full-time equivalent jobs by 2020 with 3,500 of these jobs (71% of the total expansion demand) in the proposed ISSC. The remainder of the proposed growth (1,428 jobs) would take place in the shipping and maritime transport sector, driven by investment in ports. The replacement demand is 2,373 FTEs thereby giving rise to a gross demand of 7,301 which is 128% of the estimated current work force. The distribution of the expansion and replacement demand by occupation level is shown in Table E4.

[18] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013The ship leasing component of this target is included in shipping and maritime transport in this report, and cannot be disaggregated due to data confidentiality

Table E4: Distribution of Expansion and Replacement Demand to 2020 by Occupation in the Maritime Transport, Shipping and Services Sector

	2014 estimates	Scenario 1 HOOW Target met					
		Expansion Demand		Replacement Demand		Gross Demand	
Occupation Level	Baseline	No.	% of 2014	No.	% of 2014	No.	% of 2014
Operative Grades	814	850	104%	476	58%	1,326	163%
Administration	445	651	146%	283	64%	934	210%
Skilled Trades	1,727	821	48%	706	41%	1,527	88%
Associate Professional and Technical	803	793	99%	261	33%	1,054	131%
Professionals	1,183	1,416	120%	452	38%	1,868	158%
Management	717	397	55%	195	27%	592	83%
Total	**5,689**	**4,928**	**87%**	**2,373**	**42%**	**7,301**	**128%**

Source: PACEC, 2014

An examination of the expansion demand by educational attainment shows that the concentration is at NFQ Levels 6 – 8 of the Framework, driven by the substantial increase in the number of professional and associate professional occupations, 2,209 of 4,928 (45%) required by the ISSC.

Supply-side Information

The National Maritime College of Ireland (NMCI) is a constituent college of Cork Institute of Technology (CIT) and is the national centre for education and training for careers in the Merchant Maritime sector and provides the non-military training needs of the Irish Naval Service (INS). The NMCI offers degree courses in Nautical Science, Marine and Plant Engineering and a Certificate in Seamanship.

The only specifically Maritime business courses available in Ireland are those provided by the Institute of Chartered Shipbrokers (ICS). The ICS is the only internationally recognised professional body in the maritime arena and it represents shipbrokers, ship managers and agents throughout the world. It is a major provider of education and training and sets and examines the syllabus for membership, providing the shipping industry with highly qualified professionals. An Ireland branch of the ICS was formed in 1974.

Maritime Safety applies to all sea-going vessels from merchant ships to passenger ferries, fishing trawlers and leisure craft. The Marine Survey Office of the Department of Transport, Tourism and Sport (DTTAS) is responsible for the certifications of seafarers' competencies. Safety training is provided by NMCI, BIM and several private operators. Radio operator courses are also provided by NMCI, BIM and one or two private operators.

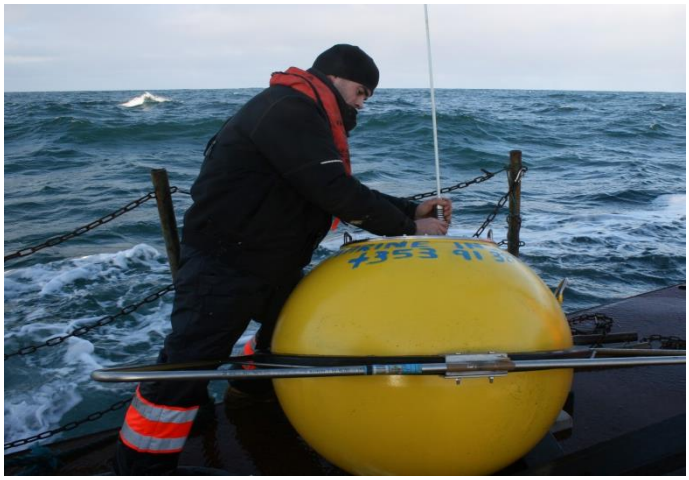
E.5 Energy

The sub-sectors assessed under this sector are:

- Oil and Gas Exploration and Production
- Marine Renewables – Offshore Wind, Wave and Tidal

Economic Profile

There are two distinct industries in the energy sector that relate to Ireland's Ocean economy, namely the offshore oil and gas sector and the offshore renewables sector. The offshore oil and gas sector is a well-established, global industry, though activities in Ireland are at a low level. The oil and gas industry relies on a flexible, mobile and international workforce and there are many skilled Irish people working in the oil and gas industry abroad.



© Marine Institute, Marine Renewable Energy Services.

Offshore Renewables is an emerging sector, which has seen dramatic growth globally over the last ten years. The Communication from the Commission Com(2014) 254 "*Innovation in the Blue Economy the EU*"[19] has shown there is a demand for marine renewables skills at a European level. The Marine Renewables Industry Association (MRIA) in Ireland carried out a study in 2011[20] and found that there was no real shortage of third-level skills in the nascent ocean energy industry in Ireland. During the course of this study the MRIA confirmed that this is still the situation.

Economic indicators for the Offshore Energy sector are outlined in Table E1. GVA in 2010 was €65 million, turnover was €138 million and direct employment was 1,077 FTE[21]. Due to the fact that the oil and gas sector is already well-established the turnover is significantly larger than the newly emerging offshore renewables sector which is expected to increase significantly in the coming years.

Company Interviews

For this study ten companies were interviewed from the Energy sector with a total of 704 employees which constitutes 61% of the total number of employees (1,148) in the marine energy sector.

Over the previous three years these companies have experienced significant growth in employment, in particular, for professionals with an increase of 167 (80%) and associate professionals and technical staff of 55 which is a 250% increase. Over the next six years these companies anticipated continued employment growth for professionals and associate professionals.

[19] Communication from the Commission. Innovation in the Blue Economy: realising the potential of our seas and oceans for jobs and growth. COM (2014) 254 http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=COM:2014:254:REV1&from=EN

[20] Third-Level Education Needs of the Ocean Energy Industry. To maximize the job and income creation potential of Ireland's ocean energy resource. Discussion Paper. MRIA. 2011. http://www.mria.ie/documents/92d05fb11cdab8d6531dd4cbb.pdf

[21] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013

Over the last three years seven of the ten companies saw an increase in their turnover, of which four had moderate growth (10% – 20% pa) and three had significant growth (>20%pa), with the remaining three indicating their turnover had remained the same. By contrast over the next six years 50% of the companies anticipated a significant increase in their exports with four anticipating a moderate increase and only one expecting their exports to stay the same. The companies also indicated that on average over the last three years 49% of their turnover was from exports.

Approximately 70% of the companies interviewed had roles which they found were difficult to recruit into. The main occupations identified were electrical and specialist engineers; people with offshore energy skills; project managers with practical experience and people with basic technical skills e.g. riggers, algae biologists and software developers.

© Marine Institute - Photographer Cushla Dromgool Regan

Stakeholder Consultation

The Oil and Gas sub-sector ranges from production to exploration and the supply chains for these areas. Production facilities need engineering skills and one such example is the Corrib Gas Field which will create approximately 131 FTEs during its 10-15 year life of field production. For exploration, the skills needed are for scientific research, typically MSc and PhD graduates. Tullow Oil, an Irish company, has its worldwide geophysics centre in Ireland employing around 90 geoscientists, though none of their activities are currently focused on exploration in Irish waters. Increased exploration is anticipated following the announcement from the DCENR for a licensing round in 2015[22].

The emergence and rapid growth in the Marine Renewable Energy sector has been driven by European targets for generating renewable energy. The EU is supporting the establishment of the wave and tidal energy sectors and a European Ocean Energy Forum has been set up to deploy demonstration projects, such as Westwave, which the ESB are developing.
Ireland is particularly well placed to compete in this emerging sector and the Offshore Renewable Energy Development Plan (OREDP)[23] published in 2014 by the DCENR provides the framework to

[22] http://www.dcenr.gov.ie/NR/rdonlyres/9B40A9A2-10AE-4E6A-9382-1D07FC76A802/0/2015LicensingRoundNotice18June2014Final.pdf
[23] The Offshore Renewable Energy Development Plan (OREDP) - A Framework for the Sustainable Development of Ireland's Offshore Renewable Energy Resource was launched in February 2014 and sets out a vision for the sector that sees it contributing to sustainable economic growth and delivering jobs in the green economy.
http://www.dcenr.gov.ie/Energy/Sustainable+and+Renewable+Energy+Division/OREDP.htm

develop offshore wind and wave energy in Irish waters without any significant environmental impacts.

Ireland also has the potential to become a centre of excellence and world leader in research, development and demonstration in the marine renewables field. At present there are five companies actively involved in developing offshore wind energy projects in Ireland. Employment opportunities are currently mostly for graduates as the sector becomes established. Once demonstration projects are deployed there will be a need for vessel operators and maintenance technicians.

Future Demand for Skills 2015 - 2020

Offshore Oil and Gas increased employment between 2007 and 2010, but lost substantial turnover and GVA over the same period. Discussions with stakeholder suggested that further employment growth, between 2010 and 2014, would have been unlikely and so the 2010 employment figure has been carried forward as the 2014 baseline.

Employment and turnover in Offshore Renewables grew between 2007 and 2010 and the consensus position, based on the evidence set out above and discussions with stakeholders, was that this growth rate would have continued between 2010 and 2014 though at a slightly lower rate.

Table E5: Distribution of Expansion and Replacement Demand to 2020 by Occupation in the Energy Sector

	2014 estimates	Expansion Demand Scenario 1 HOOW Target met		Expansion Demand Scenario 2 - HOOW Target EXCEEDED		Replacement Demand Scenario 1 HOOW Target met		Replacement Demand Scenario 2 - HOOW Target EXCEEDED		Gross Demand Scenario 1 HOOW Target met	
Occupation Level	**Baseline**	**No.**	**% of 2014**	**No.**	**% of 2014**		**% of 2014**	**No.**	**% of 2014**	**No.**	**% of 2014**
Operative Grades	47	3	6%	8	17%	23	49%	24	51%	26	55%
Administration	70	2	3%	5	7%	32	46%	32	46%	34	49%
Skilled Trades	166	8	5%	22	13%	67	40%	69	42%	75	45%
Associate Professional and Technical	125	31	25%	82	66%	41	33%	46	37%	72	58%
Professionals	603	96	16%	258	43%	204	34%	220	36%	300	50%
Management	137	10	7%	25	18%	36	26%	38	28%	46	34%
Total	**1,148**	**150**	**13%**	**400**	**35%**	**403**	**35%**	**429**	**37%**	**553**	**48%**

Source: PACEC, 2014

Scenario 1 forecasts an expansion demand of 150 jobs, all in the Marine Renewable energy sector as the Oil and Gas industry was forecast to remain constant, thus increasing employment from 1,148 in 2014 to 1,298 full-time equivalent jobs by 2020. The replacement demand is 403 FTEs thereby giving rise to a gross demand of 553 which is 48% of the estimated current work force. The distribution of the expansion and replacement demand by occupation level is shown in Table E5.

A second high-growth scenario, Scenario 2, was also developed for the Energy sector. This scenario forecasts an expansion demand of 400 FTE by 2020 with 100 additional jobs in the oil and gas

industry and 300 in the Marine Renewable industry. The distribution of the 400 additional FTE jobs by occupation level is shown in Table E5.

An examination of the expansion demand by educational attainment for both scenarios shows that the concentration is in NFQ Levels 9 - 10 of the NFQ Framework, driven by the substantial increase in the number of professional and associate professional occupations, 127 of 150 (85%) for Scenario 1 and 339 of 400 (85%) for Scenario 2.

Supply-side Information

Courtesy of photographer Tomasz Szumski

While the Offshore Energy Sector has two distinct sub-sectors there are many overlapping skill sets, e.g., engineering and working off-shore, fishermen providing services to the off-shore energy industry. In addition to offshore energy specific education and training other education and training apply such as the marine safety training and marine and environmental scientists.

The one year MSc in Petroleum Geo-science at UCD, which was launched in Sept 2013, offers science graduates a vocational training in the broad range of technical fields associated with the exploration and production of the petroleum industry.

In addition to the formal professional qualifications, specific training and qualification is required by the oil and gas industry before anyone can work on an oil rig. OPITO – Offshore Petroleum Industry Training Organisation - is the skills organisation for the oil and gas industry. Two organisations in Ireland are approved by OPITO to provide training. They are:

- Effective Offshore in Falcarragh, Co. Donegal; and
- NMCI in association with SEFtec in Ringaskiddy Co. Cork.

The marine renewable energy sub-sector is still an emerging sector and its current skills needs are more for researchers at this point in time until the industry is more developed when it will have a greater need for associate professionals and technicians. With regard to undergraduates the industry prefers students to undertake a traditional/mainstream engineering degree such as mechanical and electrical and then to specialise afterwards.

A taught masters in Marine Energy was recently launched by UCC in partnerships with seven other colleges, including Queens University in Belfast, following a consultation of stakeholders by the MRIA (Marine Renewable Industry Association) of the education needs of the industry[24].

Two SFI (Science Foundation Ireland) funded Research Centres in Ireland have also been established, namely, the iCRAG (Irish Centre for Research in Applied Geosciences) in UCD and the Marine Renewable Energy Ireland (MaREI) centre in UCC.

[24] http://www.mria.ie/documents/92d05fb11cdab8d6531dd4cbb.pdf

E.6 Tourism

© *Fáilte Ireland and Tourism Ireland.*

© *Fáilte Ireland and Tourism Ireland.*

The sub-sectors assessed under this sector are:

- Marine Tourism
- International Cruise Industry

Economic Profile

In 2010, the tourism industry contributed approximately €5.8 billion to the Irish economy and marine tourism is estimated to account for 10% of the overall value of the tourism sector in Ireland[25] [26]. The main marine tourism activities which are offered along the coastline in Ireland include angling, water sports and seaside/ resort trips[27].

Economic indicators for Marine Tourism are outlined in Table E1. GVA in 2010 was €337 million, turnover was €841 million and direct employment was 3,502 FTE. These figures are lower than the 2007 figures which stated a turnover of €944 million, a GVA of €453 million and full time direct employment of 5,836[28]. This decrease reflects the global downturn in the economy during this period.

Over 200 cruise liners, carrying 205,000 passengers, visited Ireland in 2010, an increase of over 200% in the last decade. Turnover from cruise passengers was €17 million. Increased tourism numbers from cruise passengers would give rise to increased employment in tourism services and attractions, such as, golf courses, equestrian centres, visitor attractions, car hire, coach hire, cruising and water based activity centres.

Company Interviews

For the study nine companies were interviewed from the Marine Tourism sector with a total of 83 employees which constitutes 2.4% of the total number of employees (3,502) in the sector.

Over the previous three years these companies indicated that employment declined or stayed the same for all occupations except administration. Over the next six years these companies anticipated

[25] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU, Published Dec 2013.
[26] http://www.failteireland.ie/News-Features/News-Library/Significant-growth-in-marine-tourism-achievable.aspx
[27] Ireland's Ocean Wealth. 2010.
[28] SEMRU – Ireland's Ocean Economy, 2010.

the largest employment growth would be for operatives and skilled trades at a rate of 21% and 17% respectively.

Over the last three years four of the nine companies saw an increase in their turnover while three had a decrease in turnover with two indicating their turnover had remained the same. By contrast over the next six years none of the companies anticipated a decrease in the number of foreign tourists with six of the nine companies expecting the number of foreign tourists to increase.

Approximately 33% of the companies interviewed had difficulty finding people with practical experience and knowledge of working in a marine environment (i.e. boat skippers or boat men, and people with kayak/rock-climbing skills and qualifications).

© Fáilte Ireland and Tourism Ireland. Learning to sail

© Fáilte Ireland and Tourism Ireland. Yachting Marina

Stakeholder Consultation

Cruise Tourism has been identified as potential for large growth in visitor numbers, with the associated increase in visitor expenditure creating scope for increased employment.

Ocean racing offers a good career path into professional sport but currently there is little opportunity in Ireland for Irish Olympic level sailors, so they go abroad. With this local talent pool and the unique Atlantic facing coastal areas, Ireland is an ideal location for an Ocean Racing Training Base. Such a base could be modelled on the successful development in Lorient, France where there are 1,300 jobs in the local nautical industry cluster and over 700,000 annual visitors for festivals.

The establishment of a yacht racing hub to attract international racing teams to Ireland would increase requirements for sail making, boat building and associated supply chains, in addition to the impact on tourism numbers. It can be difficult to attract school leavers to a career associated with sailing in Ireland due to the perceived lack of status, as it is not a recognised career/profession.

Future Demand for Skills 2015 - 2020

The consensus position from the stakeholder discussions was that despite the loss of employment during the recession, the prospects for growth are strong, and any continuation of the fall in employment which took place between 2007 and 2010 would have recovered by 2014. As such the 2010 employment figure has been used as the best estimate of the 2014 baseline.

Scenario 1 assumes that the turnover targets of revenue earnings of €1.5 billion in marine and coastal tourism and leisure (including cruise tourism) as set out in Harnessing Our Ocean Wealth will to be met by 2020.

The scenario forecasts an expansion demand of 3,447 jobs increasing employment from 3,502 in 2014 to 6,949 full-time equivalent jobs by 2020. The replacement demand is 1,752 FTEs thereby giving rise to a gross demand of 5,199 which is 148% of the estimated current work force. The distribution of the expansion and replacement demand by occupation level is shown in Table E6.

Table E6: Distribution of Expansion and Replacement Demand to 2020 by Occupation in Marine Tourism

	2014 estimates	Scenario 1 HOOW Target met					
		Expansion Demand		Replacement Demand		Gross Demand	
Occupation Level	Baseline	No.	% of 2014	No.	% of 2014	No.	% of 2014
Operative Grades	1,604	1,705	106%	1,100	69%	2,805	175%
Administration	422	371	88%	164	39%	535	127%
Skilled Trades	506	519	103%	265	52%	784	155%
Associate Professional and Technical	253	222	88%	57	23%	279	110%
Professionals	295	259	88%	74	25%	333	113%
Management	422	371	88%	92	22%	463	110%
Total	**3,502**	**3,447**	**98%**	**1,752**	**50%**	**5,199**	**148%**

Source: PACEC, 2014

Supply-side Information

There are many routes into Marine Tourism such as Tourism, Business, Hospitality and Catering, and Hotel management courses. There are also specific training courses available in outdoor adventure activity tourism, watersports training and certification, boat and engine training and marine and countryside guiding. For the purposes of this study the focus has been on the water based tourism, such as angling, sailing, surfing and adventure centres with a focus on water sports.

Adventure/Outdoor Activity Tourism has become one of the fastest growing sectors of the tourism industry and many of the Education and Training Boards provide 1yr NFQ level 5 or 3 year NFQ Level 7/8 qualifications in Outdoor Adventure Education.

National Governing Bodies for water based activities regulate the training, awards and qualifications. The relevant organisations are: the Irish Sailing Association – ISA; the Irish Canoe – ICU; and the Irish Surfing Association.

E.7 Maritime Monitoring, Security and Surveillance

The sub-sectors assessed under this sector are:

- High-tech marine products and services

Economic Profile

Maritime Monitoring, Security and Surveillance is an emerging sector and produced a GVA of around €20.8m in 2010 and grew its turnover between 2007 (€43.6m) and 2010 (€56m) despite the recession. Likewise, exports increased from €10.8m in 2007 to €12.3m in 2010.

The numbers in direct full time employment (FTE) are quite low compared to other marine industries; but have increased from 350 FTE in 2007, to 391 FTE in 2010.

HOOW has set a target for an increase in turnover to in excess of €61 million in marine ICT and biotechnology by 2020.

© Marine Institute - Photographer Glenn Nolan.

Company Interviews

For the study nine companies were interviewed from the Maritime Monitoring, Security and Surveillance sector with a total of 124 employees which constitutes 27% of the total number of employees (457) in the sector.

Over the previous three years these companies indicated that employment increased for Associate Professional and Technical occupations and Professional occupations. Over the next six years these companies anticipate the largest employment growth will be for Administration occupations with a modest growth also for Professional and Skilled trades. However, the sample base was very small so caution has to be exercised when drawing any conclusions.

Over the last three years seven of the nine companies saw an increase in their turnover with two indicating their turnover had not changed. By contrast over the next six years eight of the nine companies expect an increase in their exports, and only one expects their exports to remain the same.

Approximately 78% of the companies interviewed stated they had roles which were difficult to recruit into, such as, IT software developers, environmental scientists, high quality administration, technical engineers, project managers and satellite technicians.

Stakeholder Consultation

This sector is centred on high-tech marine products and services. It is currently dominated by small start-up businesses, though these companies can grow rapidly as a result of being acquired or securing investment from venture capitalists and private investors for launching new products and expanding into international markets.

© *Marine Institute - Smart Bay Buoy, Photographer James Ryan*

Government support for research and the SmartOcean[29] Ireland strategy, launched in 2010, is promoting this sector with the aim of harnessing Ireland's natural marine resources and specialist expertise in Marine Science and ICT to establish Ireland as a leader in the development of high value products and services for the global marine sector.

The marine technology sector is one of the new growth areas for the general ICT industry and companies such as IBM are working on initiatives to develop this new market. Companies will need skills on data handling, cloud computing and analytics, similar to those in the mainstream economy[30] [31].

Future Demand for Skills 2015 - 2020

As the sector continued to grow between 2007 and 2010 (in turnover, exports and employment) it has been assumed that it continued to grow in employment between 2010 and 2014 at its trend rate of 4% a year and a baseline estimate for the 2014 employment figure at 457 FTEs was therefore set.

Scenario 1 assumes that the turnover target of €61 million as set out in Harnessing Our Ocean Wealth will to be met by 2020.

The distribution of the expansion and replacement demand by occupation level is shown in Table E7. The scenario forecasts an expansion demand of 190 jobs increasing employment from 457 in 2014 to 647 full-time equivalent jobs by 2020. The replacement demand is 155 FTEs thereby giving rise to a gross demand of 345 which is 75% of the estimated current work force.

The largest increase in FTE jobs is professional occupations although there is also a significant contribution to growth from Administration and Associate Professional and Technical Occupations – combined they are 116 of the 190 additional jobs (61%).

[29] http://www.smartocean.org - SmartOcean is an initiative led by the Marine institute aimed at catalyzing the development of high value products and services by creating a critical mass of research and development activities in Marine ICT through the development of a SmartOcean innovation cluster

[30] EGFSN report - Assessing the Demand for Big Data and Analytics Skills, 2013 - 2020 http://www.skillsireland.ie/publication/egfsnSearch.jsp?ft=/publications/2014/title,12194,en.php

[31] EGFSN report -Addressing Future Demand for High-Level ICT Skills http://www.skillsireland.ie/publication/egfsnSearch.jsp?ft=/publications/2013/title,11287,en.php

Table E7: Distribution of Expansion and Replacement Demand to 2020 by Occupation in the Monitoring, Security and Surveillance Sector

	2014 estimates	Scenario 1 HOOW Target met					
		Expansion Demand		Replacement Demand		Gross Demand	
Occupation Level	Baseline	No.	% of 2014	No.	% of 2014	No.	% of 2014
Operative Grades	33	0	0%	14	42%	14	42%
Administration	44	43	98%	28	64%	71	161%
Skilled Trades	15	6	40%	6	40%	12	80%
Associate Professional and Technical	125	46	37%	32	26%	78	62%
Professionals	166	70	42%	55	33%	125	75%
Management	74	25	34%	20	27%	45	61%
Total	**457**	**190**	**42%**	**155**	**34%**	**345**	**75%**

Source: PACEC, 2014

Supply-side Information

Marine Technology comprising maritime monitoring, security, surveillance and high-tech products is an emerging area and is the application of technology in the marine environment. The main roles in marine technology include: engineers, software developers, geo-scientists, satellite technicians, environmental scientists and hydrographers. With the exception of hydrography which is directly marine focussed all the others have applications outside of the marine area.

The Irish Maritime and Energy Research Cluster (IMERC) represents a tripartite alliance between UCC, CIT and the Irish Naval Service and aims to become a research and commercial cluster of world standing and to realise Ireland's potential in the global maritime and energy markets of tomorrow.

E.8 Summary of Skills Demand across the Marine Economy

This section presents the aggregated and summarised demand forecasts for the entire marine economy by sector and occupation. A single table showing the employment, expansion, replacement and gross demand for each sector and combined is in Table E8.

Table E8: Future skill demand to 2020 by occupation and subsector for the Marine Economy

		Seafood		MTSS		Energy		Tourism		Maritime Monitoring		Total	
Occupation		No.	% of 2014	No.	% of 2014	No.	% of 2014	No.	% of 2014	No.	% of 2014	No.	% of 2014
Operatives	2014 baseline	3,043	-	814	-	47	-	1,604	-	33	-	**5,541**	-
	Expansion	514	17%	850	104%	3	6%	1,705	106%	0	0%	**3,072**	55%
	Replacement	1,296	43%	476	58%	23	49%	1,100	69%	14	42%	**2,909**	52%
	Gross	1,810	59%	1,326	163%	26	55%	2,805	175%	14	42%	**5,981**	108%
Admin	2014 baseline	392	-	445	-	70	-	422	-	44	-	**1,373**	-
	Expansion	180	46%	651	146%	2	3%	371	88%	43	98%	**1,247**	91%
	Replacement	179	46%	283	64%	32	46%	164	39%	28	64%	**686**	50%
	Gross	359	92%	934	210%	34	49%	535	127%	71	161%	**1,933**	141%
Skilled Trades	2014 baseline	934	-	1,727	-	166	-	506	-	15	-	**3,348**	-
	Expansion	237	25%	821	48%	8	5%	519	103%	6	40%	**1,591**	48%
	Replacement	344	37%	706	41%	67	40%	265	52%	6	40%	**1,388**	41%
	Gross	581	62%	1,527	88%	75	45%	784	155%	12	80%	**2,979**	89%
Associate. Professional and Technical	2014 baseline	45	-	803	-	125	-	253	-	125	-	**1,351**	-
	Expansion	0	0%	793	99%	31	25%	222	88%	46	37%	**1,092**	81%
	Replacement	10	22%	261	33%	41	33%	57	23%	32	26%	**401**	30%
	Gross	10	22%	1,054	131%	72	58%	279	110%	78	62%	**1,493**	111%
Professional	2014 baseline	365	-	1,183	-	603	-	295	-	166	-	**2,612**	-
	Expansion	373	102%	1,416	120%	96	16%	259	88%	70	42%	**2,214**	85%
	Replacement	129	35%	452	38%	204	34%	74	25%	55	33%	**914**	35%
	Gross	502	138%	1,868	158%	300	50%	333	113%	125	75%	**3,128**	120%
Management	2014 baseline	580	-	717	-	137	-	422	-	74	-	**1,930**	-
	Expansion	119	21%	397	55%	10	7%	371	88%	25	34%	**922**	48%
	Replacement	136	23%	195	27%	36	26%	92	22%	20	27%	**479**	25%
	Gross	255	44%	592	83%	46	34%	463	110%	45	61%	**1,401**	73%
Total	**2014 baseline**	**5,359**	-	**5,689**	-	**1,148**	-	**3,502**	-	**457**	-	**16,155**	-
	Expansion	**1,423**	27%	**4,928**	87%	**150**	13%	**3,447**	98%	**190**	42%	**10,138**	63%
	Replacement	**2,094**	39%	**2,373**	42%	**403**	35%	**1,752**	50%	**155**	34%	**6,777**	42%
	Gross	**3,517**	66%	**7,301**	128%	**553**	48%	**5,199**	148%	**345**	75%	**16,915**	105%

Source: PACEC, 2014

The jobs in the Marine Economy straddle the full gamut of occupations from Managerial and Professional to Operatives. While many of the skills are the same as for land based jobs but with some additional upskilling to work in the Marine Environment, e.g. electricians, some are specific to the Marine economy, such as tug operators, Ship Captains and Naval Architects where very specific education and training is required. For many other occupations such as engineers in the energy

sector this requires a basic engineering degree e.g. mechanical or electrical followed by a specialisation by completing a masters degree.

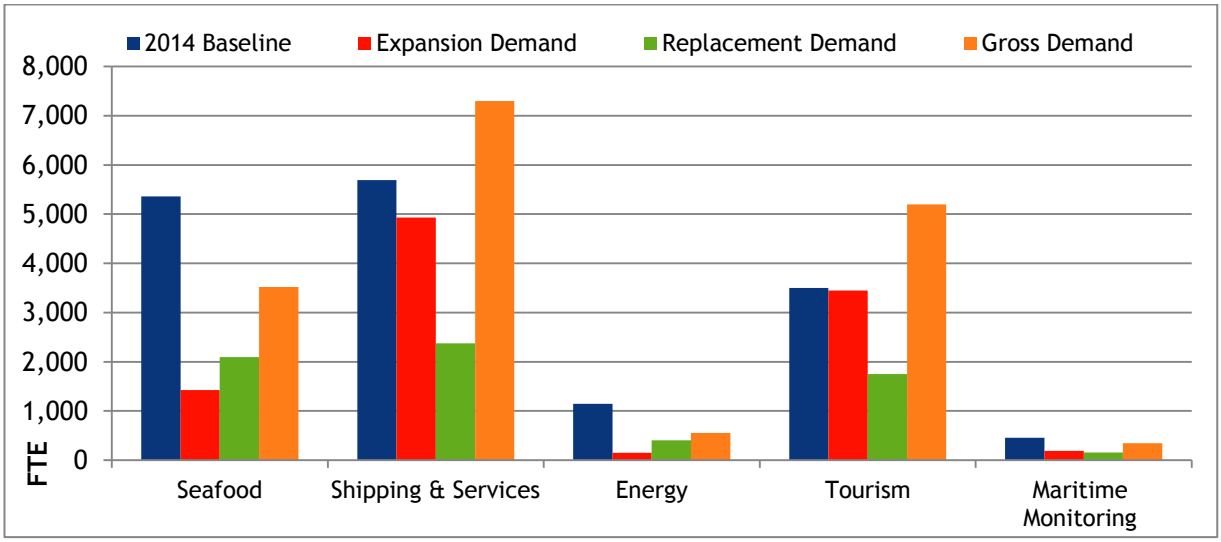
Future Skills Demand by Sector

The current employment across the entire marine economy is 16,155 full-time equivalents.

Across the five broad sectors, the total expansion demand for Scenario 1, i.e., meeting the HOOW targets, is forecast to be 10,138 FTE jobs, with the largest expansion of 4,928 in maritime transport, shipbuilding and services (driven primarily by the 3,500 expansion demand arising from the proposed International Shipping Services Centre (ISSC)) with marine tourism following with a 3,447 FTE expansion demand, reflecting the upturn in the global economy and the return of foreign tourists. If the growth in the seafood and bio-products sector does not occur owing to lack of growth in aquaculture then the total expansion is 8,715 (10,138 less 1,423).

The replacement demand is greatest in terms of actual numbers for the Maritime Transport, Shipbuilding, and Services (MTSS) (2,373) and Seafood and Bio-Products (2,094) sectors but in terms of the percentage of the 2014 baseline employment marine tourism has the greatest replacement demand at 50% (1,752) of its current work force to be replaced.

Figure E2: Future Skill Demand by Sector



Source: PACEC, 2014

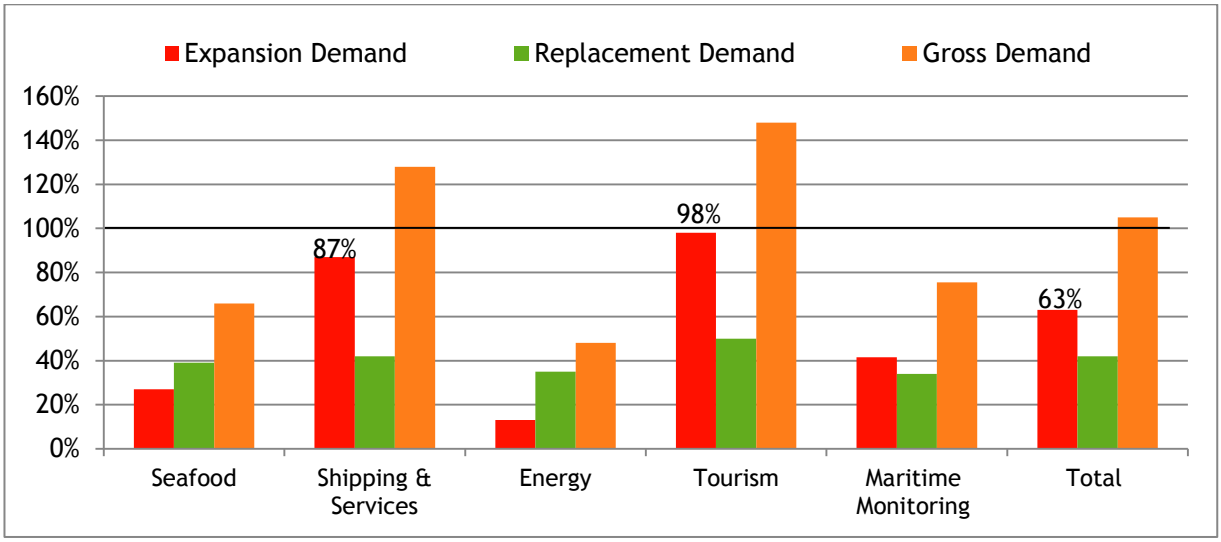
The sectors with the greatest skills demand are maritime transport, shipbuilding, and services (MTSS), marine tourism, and seafood. In the case of seafood unlike MTSS and marine tourism the replacement demand is greater than the expansion demand.

Over the entire Marine Economy the replacement demand is 6,777 some 3,361 less than the expansion demand. The total gross demand out to 2020 for the Marine economy is 16,915 FTE positions.

In Figure E3 the expansion, replacement and gross demand are displayed as a percentage of the current 2014 employment. In the case of tourism while its expansion demand is only 2nd highest, after MTSS, as a percentage of the 2014 employment it has the largest expansion at 98%, meaning employment in tourism will almost double by 2020. Both MTSS and tourism are forecast to expand

at a rate greater than the expansion demand of the total marine economy which is forecast to expand, in employment, by 63%.

Figure E3: Future Skill Demand by Sector as a % of the 2014 FTE Baseline estimate for the occupation



Source: PACEC, 2014

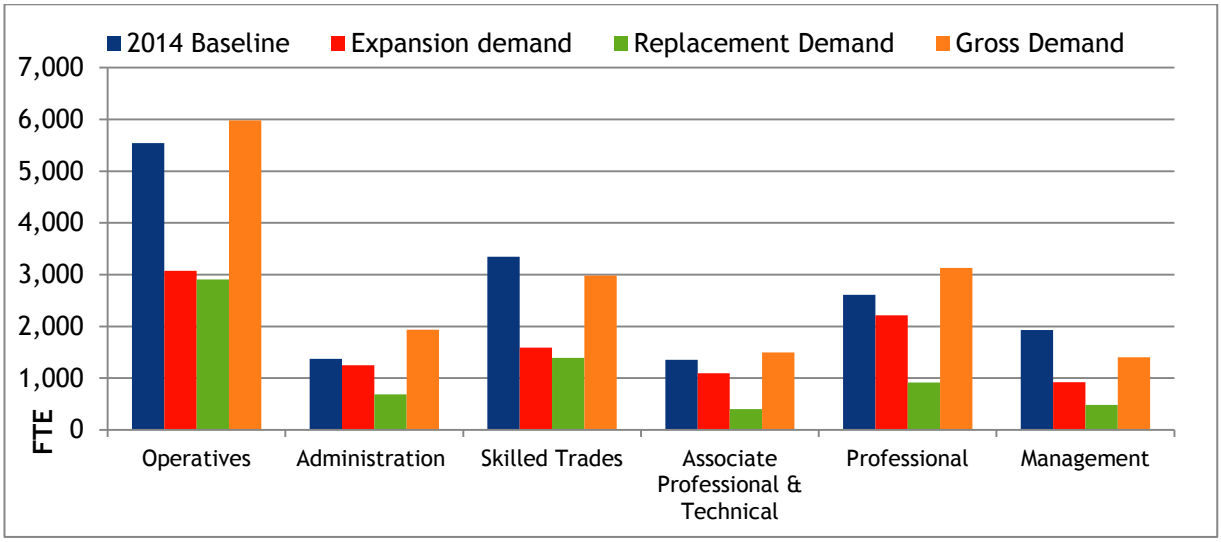
Future Skills Demand by Occupation across the total Marine Economy

Operatives comprise the largest occupation across the marine economy with a 2014 baseline estimate of 5,541 FTEs which is 34% of the total full-time employment. Not surprisingly, therefore, it is also the occupation category with the largest expansion demand of 3,072 (30% of the expansion demand). This reflects the nature of much of the work within the Marine economy. There is also strong expansion demand for professionals (2,214 FTE (22% of total expansion)) which reflects the expansion demand arising from the ISSC but also the anticipated professionalisation of enterprises within the marine economy.

Skilled Trades is the next largest occupation category at 3,348 FTEs (21% of the total marine economy (Figure E5)) and has an expansion demand of 1,591 FTEs which is 48% of the total 2014 skilled trade employment (Figure E6) and 16% of total expansion (Figure E5) reflecting the skilled nature of the work within the marine economy.

The occupations generating the highest gross demand are operative roles (5,981 FTE, or 35% of the total gross demand). This is driven by expansion in the tourism sector (where expansion demand exceeds replacement demand (Figure E.2), and the high proportion of operatives in seafood. There is also strong gross demand for professionals (3,128 FTE) and skilled trades (2,979 FTE), the former being driven by the ISSC.

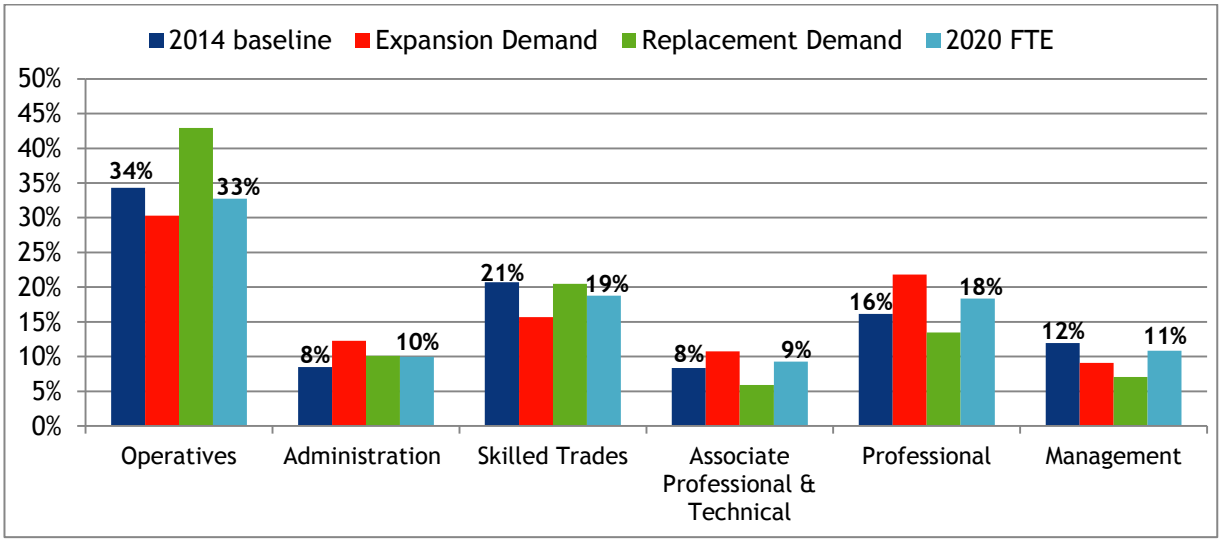
Figure E4: 2014 Future Skills Demand by Occupation Grade for the whole Marine Economy



Source: PACEC, 2014

While professionals have a lower 2014 employment then for skilled trades their expansion demand is greater at 2,214 FTE which is 22% of total expansion (Figure E5) and 85% of the 2014 Professional FTE (Figure E6), which is almost a doubling of the number of professionals working in the marine economy by 2020.

Figure E5: Proportion of an Occupation to the total within the displayed FTE cohort



Source: PACEC, 2014

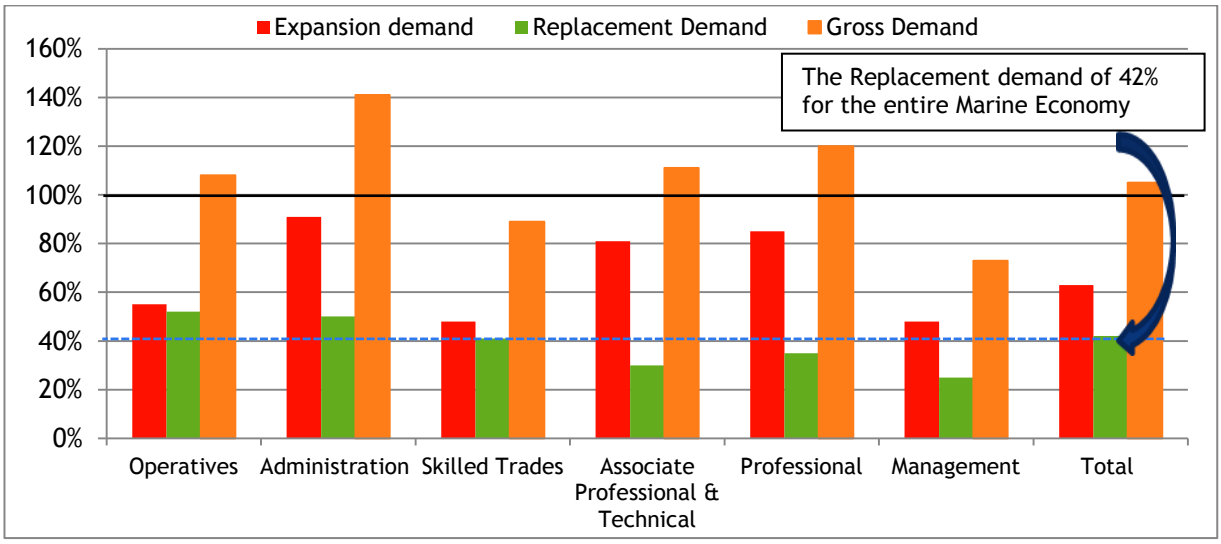
The proportion of an occupation to the total employment in 2014 and that forecast for 2020 is not hugely different. The largest component is operatives at 34% in 2014 and 33% in 2020 with the replacement demand greater than the expansion demand.

In the case of professionals the opposite picture emerges with the composition of professionals rising from 16% of total employment in 2014 to 18% in 2020 and the expansion demand in this case is greater than the replacement demand, largely driven by the ISSC. This is further emphasised when we take the combined Professional and Associate Professional & Technical occupations, which is 33%

(22% and 11% respectively) of the total expansion demand, whereas the 2014 combined Professional and Associate Professional FTE is 24% (16% and 8% respectively) (Figure E5) of the total marine employment. This 9% increase also points to an increasing professionalisation of the marine economy and the expansion of the emerging sectors which require more professionals in the initial years.

The expansion demand for the marine economy is 63% of the 2014 FTE employment. It is interesting to note that the expansion for professionals, associate professionals and technical and administration are all higher than this. While this indicates a degree of professionalisation of the marine economy all of these occupations are starting at a lower base which also would account for the higher percentage. However from Figure E4 we see that the expansion of professionals is the second highest. After operatives, at 2,214 which is an 85% increase in the number of professionals (Figure E6).

Figure E6: Future Skills Demand by Occupation as % of 2014 baseline for the occupation



Source: PACEC, 2014

Future Skills Demand by Sector and Occupation across the Marine Economy

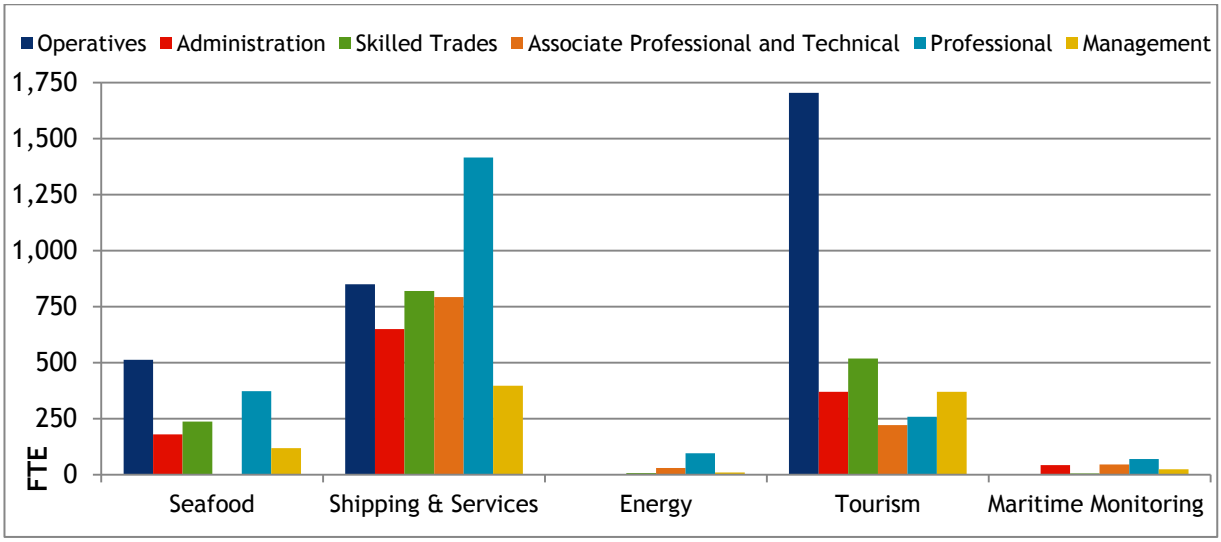
This section examines the skills demand by occupation and sector which demonstrates clearly the contrasting skills demand in the different sectors. The Figures E7 and E8 show the difference between the expansion and replacement demand for each occupation and sector.

The sector Maritime Transport, Shipping and Services requires the largest number of professionals largely attributed to the ISSC. The largest component of the expansion demand is for operatives in tourism. Seafood also requires 373 professionals which is 26% of seafood's total expansion demand. While energy and maritime monitoring have small numbers their largest expansion is for professionals as both these sectors are emerging.

The picture of the replacement demand is somewhat different to the expansion demand. The single biggest difference is the large number of operatives for seafood, at 1,296 is the largest component.

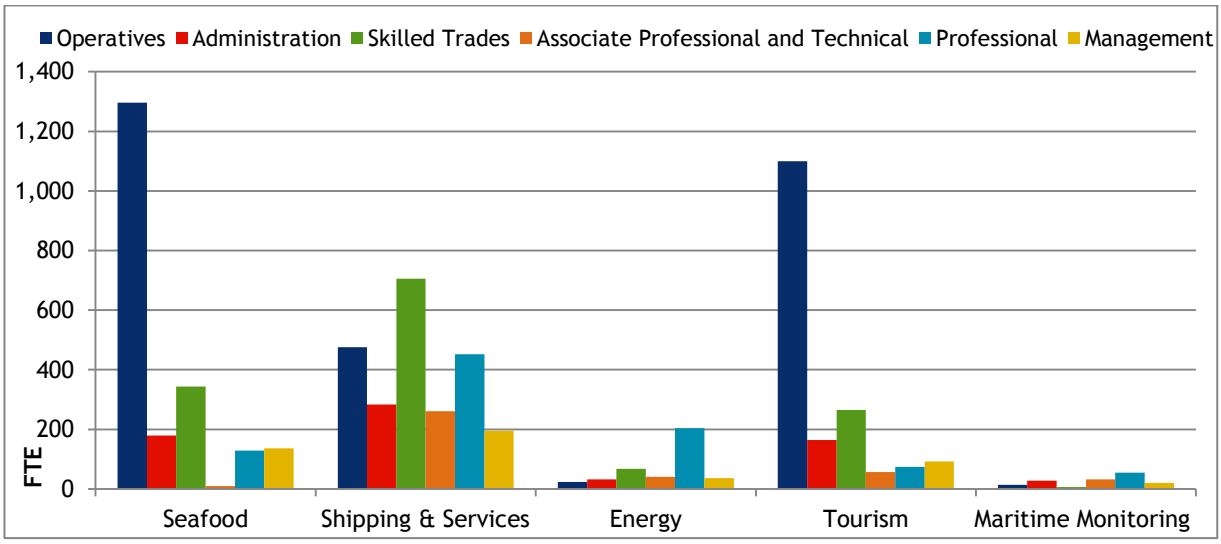
Replacement demand is higher for operatives and low skill occupations compared to professional and managerial occupations, so the sectors with a higher proportion of employees as operatives such as tourism and seafood have a higher replacement demand.

Figure E7: Expansion Demand by Occupation Group within a Marine Sector



Source: PACEC, 2014

Figure E8: Replacement Demand by Occupation Group within Marine Sector



Source: PACEC, 2014

Conclusion

There are many opportunities for a career in the marine economy. As most of the industry is in coastal areas it therefore provides employment opportunities in these rural areas. Many of the skills are transferable across the different sectors, e.g. fishermen providing services to the offshore energy sector, merchant seafarers finding employment in the ports after they give up working at sea.

The sectors with the greatest skills demand are seafood, maritime transport, shipbuilding, and services (MTSS) and marine tourism. The replacement demand for the seafood sector is greater than its expansion demand, as the replacement demand of the operative-grade jobs, prevalent in the sector, is higher than that for professional or managerial grades. In the case of tourism the

expansion demand is greater than the replacement demand even though like the seafood sector it has a large number of operatives but this sector is expected to double its FTEs by 2020. In the case of MTSS the largest component of its expansion demand is for professionals. In seafood the workforce is ageing and this will present a skills difficulty unless measures are put in place to attract and upskill younger workers.

A key finding in the course of the study is the concept of "marinisation". Many of the occupations and qualifications are either non-technical, e.g., managers, professionals or associate professionals in fields such as law, accountancy and business development, or not specific to the marine economy, e.g., engineering and software development. None of these qualifications are specific to the marine sector, but may be "marinised" – that is, additional training or a top up qualification in a marine context. "marinisation" applies across the full spectrum of occupations and qualifications such that a mechanical engineer, an electrician or a construction worker can upskill or "marinise" his/her skills and be able to work in a marine or off-shore environment. This upskilling or "marinising" of a skill provides more employment opportunities.

In addition to "marinising" traditional disciplines and training, ICT skills need to be embedded in existing maritime education and training as the pervasiveness of ICT in all aspects of the economy, including the ocean economy, takes hold. This extends to all occupations and the ICT skills of coastal communities needs to be improved so that ICT becomes an integral part of the marine economy.

E.9 Recommendations

1 Establish a Marine Discover Programme modelled on the SFI Discover Programme to raise awareness among primary, second and third level students and the Irish public about the range of careers opportunities in the Marine Economy.

The SFI Discover Programme, seeks to promote the awareness and engagement of the Irish public with science, technology, engineering and maths (STEM), to increase interest in STEM among students, teachers and members of the public and to contribute to Ireland's continued growth and development as a society – one that has an active and informed interest and involvement in STEM.

A Marine Discover Programme should broadly follow the model used by SFI and in many cases would be part of the SFI Discover programme where the STEM subjects would be of relevance to the marine sector.

The Marine Institute should lead on and be the co-ordinator for this programme. Other organisations that should be involved are: Bord Iascaigh Mhara (BIM) The Maritime Development Organisation (IMDO), Fáilte Ireland, Maritime Safety Directorate and Marine Survey Office in Department of Transport, Tourism and Sport (DTTAS), SFI, SOLAS, HEA, IUA, IOTIs, NMCI, Institute of Career Guidance Councillors, Geological Survey of Ireland (GSI) and DCENR, Industry bodies and private training providers.

Lead: Marine Institute on behalf of the Marine Co-ordination Group

2 Monitor the skills needs in each sub-sector of the Marine Economy on an ongoing basis to ensure a sufficient supply of skills is available as the trigger points for accelerated growth of a sub-sector are reached.

When the International Shipping Services Centre (ISSC) is established with the predicted creation of 3,500 jobs, measures will need to be put in place to ensure there is a sufficient supply of qualified personnel, such as shipping brokers, legal and business professionals with knowledge of the maritime industry.

As the process for aquaculture licensing becomes streamlined and the number, size of farms and production increases there will be an increased demand for the skills in aquaculture.

As activity increases facilitated by the 2015 licensing round for oil and gas exploration and proposals for a new fiscal regime which would accelerate if there was a find, there will be a greater demand for skills. While the time scales for this process will give sufficient time to put measures in place the situation will need to be monitored.

Lead: Marine Co-ordination Group

3 Update Marine Economy data regularly to ensure accurate data

The SEMRU (Socio Economic Maritime Research Unit, NUIG) publication "Ireland's Ocean Economy" which was published in December 2013, with 2010 as the data reference year and the 2010 publication with 2007 reference data is a cross cutting look at the entire marine economy and which was the reference data used in HOOW. However, there is a considerable time lag with the data owing to a time lag with the CSO data. The HOOW Development Task Force is addressing this issue as the need to have more up to date information to enable monitoring the performance of the Ocean Economy is accepted as being an imperative.

BIM surveys provide information on the seafood sector that could be used to monitor development and growth of employment and IMDO are piloting a survey scheme in relation to maritime shipping companies.

Ireland's Ocean Economy should be updated, at a minimum every 2 years, to provide a more accurate and up-to-date set of figures of the economic profile of the marine economy which would facilitate a watching brief of the growing areas and the likely areas that will need more skills.

Lead: Marine Co-ordination Group, Marine Institute and SEMRU

4 Develop a mentoring programme for the Seafood sector.

The seafood subsector has an ageing workforce and the development of a mentoring programme so that those who will be retiring over the next few years can pass on their knowledge and experience to those younger than them would ensure their experience and expertise won't be lost to the sector. It could also include the possibility of retaining the retirees as mentors for a period so the depth of expertise can be passed on.

Lead: BIM

5 Develop a data-collection and biological sampling course for fishermen

Fishermen trained in data-collection and biological sampling would be in a position to provide consistent and valuable data to researchers and industry/science partnership initiatives. Scientists and fishery managers are aware of the problems arising from lack of sufficient good quality data and using fishermen to provide timely and accurate data would be a significant advantage.

Lead: BIM

6 Provide ICT Training to coastal communities and workers in the marine economy

ICT skills need to be more broadly available to the coastal community as many people living in these areas have little knowledge or experience of ICT. An outcome from this initiative would be more mainstream use of ICT with the marine economy

Lead: BIM, in conjunction with SOLAS, ETBs and NALA

Chapter 1: Introduction

1.1 Introduction

Under the Government Action Plan for Jobs 2014, the Expert Group on Future Skills Needs (EGFSN) committed to undertaking a detailed assessment of the "future skills needs and labour market supply and demand trends in the marine/maritime area in the context of *Harnessing Our Ocean Wealth - An Integrated Marine Plan for Ireland* (HOOW)".

The overarching aim of this study is to assess the profile and diversity of the occupations and skills requirements for the various sectors and subsectors of the Marine/Maritime Economy and to propose recommendations to ensure the right skill base to meet the enterprise needs.

In the context of this study the Ocean Economy and the Marine and/or Maritime Economy are used interchangeably and the terms Marine and Maritime are sometimes used together or individually. Irrespective of the term used, it means "**all** activities relating to the sea" unless otherwise specified.

The Ocean or (Marine/Maritime) Economy is defined as "*Economic Activity that indirectly or directly uses the marine as an input*"[32]. The number of sub-sectors associated with the Marine/Maritime economy is vast and each of these in turn is interlinked and also interacts with other sectors outside the marine area.

The sectors of the ocean economy can be grouped in many different ways, e.g. established markets and emerging markets; or Mature, Growth and pre-development stage; or Services, Resources and Manufacturing. For the purposes of this study the complex web of maritime economic activities were grouped around five broad maritime sectors, each with one or more sub-sectors as follows:

1. Seafood and Bio-Products (Sea Fisheries; Marine Aquaculture; Seafood Processing; and Marine Biotechnology and Bio-Processing)
2. Maritime Transport, Shipbuilding and Services (Shipping and Maritime Transport; Marine Retail Services; Marine Manufacturing, Construction and Engineering; and Marine Commerce and Ship Leasing)
3. Energy (Offshore Oil and Gas Exploration and Production; and Marine Renewables: Offshore Wind, Wave and Tidal)
4. Tourism (Marine Tourism and International Cruise Industry)
5. Maritime Monitoring, Security and Surveillance (High-tech Marine Products and Services).

1.2 Context

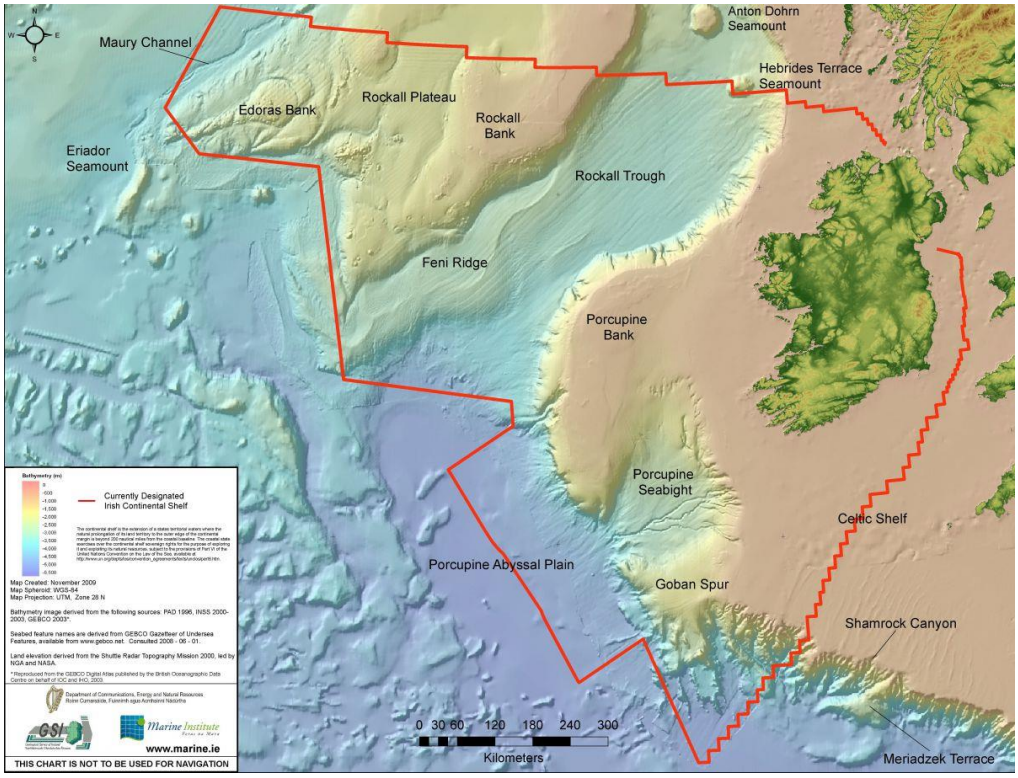
Taking our seabed area into account, Ireland is one of the largest EU states; with sovereign or exclusive rights over one of the largest sea to land ratios (over 10:1) of any EU State (Figure 1.1). Our coastline of 7,500 km is longer than that of many European countries and yet this is a resource we often overlook.

Our ocean is a national asset, supporting a diverse marine economy, with vast potential to tap into a €1,200 billion global marine market for seafood, tourism, oil and gas, marine renewable energy,

[32] Source: Harnessing Our Ocean Wealth - An Integrated Marine Plan for Ireland. 2012 http://www.ouroceanwealth.ie/Pages/default.aspx

and new applications for health, medicine and technology. In 2010, (the latest year for which data is published), Ireland generated 1.2% of GDP (€2.4bn direct and indirect Gross Value Added (GVA)) from its ocean economy, supporting about 1% of the total workforce. A comparison between 2007 and 2010 data saw a 25.4% decrease in turnover, a 20.9% fall in employment and a 29.7% decrease in direct GVA[33]. Global marine economic activity is estimated to contribute 2% of the world's GDP and the European Commission estimates that between 3% and 5% of Europe's GDP was generated from sea-related industries and services in 2007.

Figure 1.1: The Real Map of Ireland



© Marine Institute and the Geological Survey of Ireland

1.3 Marine Governance and the National Policy Agenda

Responsibility for marine activities is spread across a number of government departments and agencies depending on their functions (Appendix 1). In recognition of the broad scope of the sector and the need for better co-ordination, the Government established in 2009 the Inter-Departmental Marine Co-ordination Group (MCG), chaired by the Minister for Agriculture, Food and Marine and hosted by the Department of the Taoiseach. Departments represented on the Group are as follows[34]:

- Agriculture, Food and the Marine (DAFM)
- Taoiseach
- Defence
- Communications, Energy and Natural Resources (DCENR)

[33] http://www.nuigalway.ie/semru/documents/irelands_ocean_economy_report_series_no2.pdf

[34] http://www.ouroceanwealth.ie/Lists/News/DispForm.aspx?ID=9

- Arts, Heritage and the Gaeltacht (DAHG)
- Environment, Community and Local Government (DECLG)
- Jobs, Enterprise and Innovation (DJEI)
- Public Expenditure and Reform (DPER)
- Transport, Tourism and Sport (DTTS)
- The Attorney General's Office and the Marine Institute also participate.

The MCG provides a strategic high-level, cross-government mechanism to address key challenges and opportunities related to the development of the marine sector. The MCG developed and overseas the implementation of Ireland's Integrated Marine Plan – *Harnessing our Ocean Wealth* (HOOW).

Given the spread of departments with responsibilities for marine activities it follows that several existing national policy initiatives and strategies are also linked to the marine economy and are taken into account in both the HOOW strategy and in the research for this study. These include:

- Food Harvest 2020 – a vision for Irish Agri-food and fisheries[35]
- Bord Iascaigh Mhara Strategy (2013 – 2017)[36]
- BIM Annual Aquaculture Survey (2012)[37]
- The National Ports Policy (2013)[38]
- The Strategic Review of Irish Maritime Transport Sector (1996 – 2005)[39]
- Irish Maritime Transport Economist (2003 – 2013)[40]
- Strategy for Renewable Energy (2012 – 2020)[41]
- Offshore Renewable Energy Development Plan (2014)[42].

1.4 Harnessing Our Ocean Wealth (HOOW) – An Integrated Marine Plan (IMP)

In 2012 the Government launched *Harnessing Our Ocean Wealth - an Integrated Marine Plan (IMP) for Ireland.* This plan sets out a roadmap for the Government's vision, high-level goals and integrated actions across policy, governance and business to enable our marine potential to be realised. The vision set out in *Harnessing Our Ocean Wealth* is as follows:

*Our **ocean wealth** will be a key element of our **economic recovery** and sustainable growth, generating **benefits for all our citizens**, supported by coherent policy, planning and regulation, and managed in an integrated manner.*

[35] http://www.agriculture.gov.ie/agri-foodindustry/foodharvest2020/
[36] http://www.bim.ie/media/bim/content/publications/BIM%20Strategy%202013-2017.pdf
[37] http://www.bim.ie/media/bim/content/downloads/BIM%20Aquaculture%20Survey%202012.pdf
[38] http://www.dttas.ie/sites/default/files/node/add/content-publication/National%20Ports%20Policy%202013.PDF
[39] http://www.dttas.ie/sites/default/files/node/add/content-publication/IMDO%20Strategic%20Review%20of%20Irish%20Maritime%20Transport%20Sector.pdf
[40] http://www.imdo.ie/NR/rdonlyres/43882410-A782-4EE4-BCE7-744618CF58D4/0/IMTEVolume10.pdf
[41] http://www.dcenr.gov.ie/NR/rdonlyres/9472D68A-40F4-41B8-B8FD-F5F788D4207A/0/RenewableEnergyStrategy2012_2020.pdf
[42] http://www.dcenr.gov.ie/nr/rdonlyres/836dd5d9-7152-4d76-9da0-81090633f0e0/0/20140204dcenroffshorerenewableenergydevelopmentplan.pdf

Three high-level goals, of equal importance, based on the concept of sustainable development have been developed.

Goal 1 focuses on a **thriving maritime economy**, whereby Ireland harnesses the market opportunities to achieve economic recovery and socially inclusive, sustainable growth.

Goal 2 sets out to achieve **healthy ecosystems** that provide monetary and non-monetary goods and services (e.g. food, climate, health and well-being).

Goal 3 aims to **increase our engagement with the sea**. Building on our rich maritime heritage, our goal is to strengthen our maritime identity and increase our awareness of the value (market and nonmarket), opportunities and social benefits of engaging with the sea.

HOOW set out two main targets to be reached; these are to:

- double the value of Ireland's ocean wealth to 2.4% of GDP by 2030; and
- increase the turnover from Ireland's ocean economy to exceed €6.4bn by 2020.

HOOW provides a new momentum for growth in the marine area and seeks to ensure government departments work together more efficiently and effectively on the diverse issues related to the marine economy.

1.5 The European Agenda

HOOW's vision and goals are framed within the context of what is happening at the broader global and EU levels, particularly the Integrated Maritime Policy for the European Union, recognising the contribution the 'blue economy' can make to global economic growth and the need for appropriate policies, strategies and funding mechanisms to enable this.

The Marine Co-ordination Group also facilitates national responses to EU initiatives such as those evolving from the Europe 2020 Strategy[43] and the Integrated Maritime Policy for the European Union[44].

In 2007, following a Europe wide consultation process, the Commission took a landmark decision to:

- establish a Directorate General for Maritime Affairs[45] (DG MARE); and
- to publish an Integrated Maritime Policy for the European Union (IMP-EU) and an associated Action Plan (The Blue Book).

The Commission also launched a Europe wide consultation to identify the most important growth scenarios and the domains where the EU can help unlock the full potential of the marine resource published in 2012 "*Blue Growth – Scenarios and drivers for Sustainable growth from the Oceans, Seas and Coasts*"[46] which recommends actions needed to develop Europe's maritime economy.

[43] http://ec.europa.eu/europe2020/index_en.htm
[44] http://ec.europa.eu/maritimeaffairs/policy/index_en.htm
[45] http://ec.europa.eu/dgs/maritimeaffairs_fisheries/index_en.htm
[46] https://webgate.ec.europa.eu/maritimeforum/system/files/Blue%20Growth%20Final%20Report%2013092012.pdf

Other important Europe wide initiatives with a prominently integrated focus that have already been undertaken include:

- The **Marine Strategy Framework Directive**[47] **(MSFD)**, the environmental pillar of the IMP-EU, which requires Member States to achieve good environmental status in their marine waters by 2020. The implementation of this Directive will benefit from the further development of cross-cutting tools of the IMP-EU, such as **Marine Spatial Planning**[48] **(MSP)** and **Marine Knowledge 2020**[49]. The Marine Knowledge 2020 Strategy aims to improve the knowledge of Europe's seas and oceans and use this data to develop knowledge-based and internationally traded products and services.
- Closely related to the MSFD, the **reform of the Common Fisheries Policy** [50]**(CFP)** has integrated the ecosystem approach as an overarching principle.

There is a range of legislative requirements that must be adhered to when planning and permitting maritime activities. The origins of these requirements have their roots in a combination of national, EU and international legislation, agreements and policies. The Environmental Directives relevant to the Marine Economy and the responsible department for their transposition include:

- Water Framework Directive (2000), DECLG
- Birds Directive (1979 and 2009), DAHG
- Habitats Directive (1992), DAHG
- Marine Strategy Framework Directive (2008), DECLG
- Environmental Impact Assessment Directive (1985 and 1997), DECLG
- Strategic Environmental Assessment Directive (2001), DECLG
- Data Collection Framework for the Common Fisheries Policy (2008), DAFM
- Shellfish Waters Directive (2006), DECLG.

This gives an indication of the complexity involved in developing a coherent and thriving marine economy

1.6 The Ocean Economy

The marine economy in Ireland has been identified as a significant area with regards to future growth. It has the potential to grow a substantial amount in the next few years and therefore create employment for the residents of Ireland directly and indirectly.

The Socio Economic Marine Research Unit (SEMRU) in NUIG undertook the extensive task of data collection and analysis of Ireland's ocean economy. Marine socio-economic data are not readily available in Ireland (nor indeed in the other European countries) primarily because the economic profile of the ocean economy is not distinct from other aspects of the broader economy. Only a proportion of the NACE codes[51] relate solely to a maritime activity with the majority being only partially relevant. A list of the NACE codes relevant to the Ocean economy is in Appendix 2.

[47] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:164:0019:0040:EN:PDF
[48] http://ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning/index_en.htm
[49] http://ec.europa.eu/maritimeaffairs/policy/marine_knowledge_2020/
[50] http://ec.europa.eu/fisheries/cfp/index_en.htm
[51] NACE Code is a Statistical classification of economic activities in the European Community. http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(NACE)

Table 1.1: Direct Employment (FTE), GVA and Turnover for subsectors within the Marine Economy

Sector Sub-sector	Direct Employment (FTE)	GVA (€millions)	Turnover (€millions)	National Strategy/ Targets
Seafood and Bio-Products	**5,633**	**256**	**745**	
Sea Fisheries	2,825	116	202	FH(Food Harvest) 2020 - Target 14,000 FTE (from 11,000) Turnover target - €1bn from €0.7bn
Marine Aquaculture	918	47	123	
Seafood Processing	1,586	80	390	
Marine Biotechnology and Bio-Processing	304	13	30	
Maritime Transport, Shipping and Services	**5,689**	**540**	**1,658**	
Shipping and maritime transport	4,633	422	1,422	HOOW Turnover Target >€1.2bn (derived from baseline level of activity as measured by SEMRU – Ireland's Ocean Economy
Marine Retail Services	252	34	58	
Marine Manufacturing, Construction and Engineering	726	44	111	
Marine Commerce and Ship Leasing	78	40	67	IMDO Turnover €2.6bn for Marine Commerce and Ship leasing
Energy	**1,077**	**65**	**138**	
Offshore Oil and Gas Exploration and Production	861	61	126	
Marine Renewables – Offshore Wind, Wave and Tidal	216	4	12	
Tourism	**3,502**	**337**	**858**	
Marine Tourism and Leisure	3,502	337	841	HOOW Turnover Target: €1.5bn
International Cruise Industry	N/A	N/A	17	
Maritime Monitoring, Security and Surveillance	**391**	**21**	**56**	
High-tech marine products and services	391	21	56	>€61m projected turnover- based on 2007 SEMRU company survey
Total	**16,292**	**1,219**	**3,455**	

Source: SEMRU, Ireland's Ocean Economy Report 2013 (Reference year: 2010) [52]

Ireland's Ocean Economy, Ref. Year: 2010 is the latest published economic data for the ocean economy and is the data used in HOOW. Table 1.1 provides some key economic indicators for each subsector.

[52] http://www.nuigalway.ie/semru/documents/irelands_ocean_economy_report_series_no2.pdf

1.7 Jobs in the Ocean Economy

The marine economy offers a wide and diverse range of career opportunities. The types of jobs found in each of the sectors are detailed in the chapters dealing with a specific sector and also in Appendix 3. The occupations within the ocean economy are distributed across all levels: management (including specialist management functions), professionals (including engineers, scientists); associate professionals (e.g. technicians), operatives; sales; and elementary occupations and reflect the diverse educational requirements: Higher (HE) and Further Education and Training (FET); Leaving Certificate; Junior Certificate and No Formal Qualifications.

Increasingly more complex technical projects and opportunities offered by convergence in the marine sector mean that far greater interdisciplinary knowledge and experience of working in multi-disciplinary work environments is and will continue to be required which will mean bringing together professionals from diverse backgrounds working together in multi-disciplinary teams - such as engineers, planners and architects with ecologists, biologists, and chemists.

© Marine Institute - Photographer Paul Kaye

The marine economy, both nationally and globally, has a requirement for technicians and general operatives as well as highly skilled technical staff and professionals. The core skills and knowledge of these occupations, e.g. electricians, metal workers and mechanical engineers, are relevant to both land and sea based roles and as such are transferable. The land-based skills can be "marinised" to deal with the challenges of working in an off-shore and/or a marine environment.

1.8 Objectives and Methodology

The overarching aim of the study is to assess the profile and diversity of the occupations and skills requirements for the various sectors and their sub-sectors of the Marine/Maritime Economy and to propose recommendations to ensure that we have the right skill base to meet the skills needs of enterprises in the Marine economy.

The focus of the study is on those sectors of the marine economy which were identified in HOOW as the main ones which contribute to the Irish Marine Economy. Within each sub sector there is an assessment of the current and future skills requirements by occupational group, namely: operatives, administration, skilled trades, associate professional and technical, professionals, and management.

There were two distinct phases to the study:

The objectives of **Phase 1** were to quantify and assess the adequacy of:

- The current profile, diversity and pool of skills within the existing workforce in the marine economy;
- The current and planned supply of relevant skills from the education and training system, including the in-company education and training and Continuing Professional Development, which together are required to satisfy current and anticipated enterprise skills demand; and

- An assessment of the current and anticipated skills capability demand and how these skills requirements may be best met.

This phase of the research comprised four main elements:

1. Desk review of relevant government policies, economic profile and data on education/skill levels within each subsector;
2. Telephone interviews were conducted, using a structured questionnaire format, with 60 maritime enterprises from across the ocean economy taking into account the size of company, ownership (foreign/indigenous) and stage of development (start-up/mature);
3. Interviews were undertaken with stakeholders from the key Government departments, development agencies, education providers, industry associations and other organisations involved in the marine economy to ascertain their views on the current and anticipated skills demand and how these skills requirements may best be met; and
4. Four thematic workshops were facilitated with selected companies and key stakeholders.

The objectives of **Phase 2** were to:

- Assess and quantify the future skills requirements out to 2020 and to forecast the labour market supply and demand trends in the context of Harnessing Our Ocean Wealth; and
- Make recommendations to ensure that the supply of skills in Ireland will be sufficient to meet the anticipated enterprise skills demand out to 2020.

This second phase involved modelling the future demand for skills in the ocean economy; this was modified by information from other published forecasts, information from interviews with businesses and stakeholders, and supply-side constraints/ policy interventions. The model encompassed the following elements:

- A review of the demand side of the labour market at national and sectoral levels;
- A review of published economic forecasts;
- A baseline assessment of the ocean economy (taken from 2014 levels); and
- Modelling of future ocean economy employment and skills demand to 2020.

1.9 Skills Demand Scenarios

The most recent official economic data is that provided by SEMRU which covers the years 2007 and 2010[53] [54]. In order to develop forecasts of the future skills demand to 2020 it was necessary that baseline estimates for 2014 be produced[55]. This was done using additional sources of information, such as: annual CSO (Central Statistics Office) employment trend data for broad sectors; Economic and Social Research Institute (ESRI) Medium Term Review (MTR) 2013 – 2020 and SOLAS Occupational Employment Projection 2020 (Jan 2014); results from company surveys; and discussions with stakeholders. The outcome from this exercise is shown in Table 1.2.

[53] http://www.marinekic-initiative.eu/docs/IrelandOceanEconomy12.pdf
[54] http://www.nuigalway.ie/semru/documents/irelands_ocean_economy_report_series_no2.pdf
[55] The 2014 employment estimates were based on the SEMRU 2010 data which was the latest available data at the time. SEMRU are currently updating the 2010 data and will publish the 2012 figures later in 2015. The SEMRU publication will also present 2014 estimates but based on 2012 data.

Table 1.2: 2007 and 2010 FTE Employment and 2014 Baseline FTE Estimates for the Ocean Economy

Sub-sector	2007‡	2010‡	2014*
Total - Seafood and Bio-Products	**5,615**	**5,633**	**5,359**
Sea Fisheries	2,200	2,825	2,513
Marine Aquaculture	1,061	918	918
Seafood Processing	2,090	1,586	1,586
Marine Biotechnology and Bio-Processing	264	304	342
Total - Maritime Transport, Shipbuilding and Services	**7,895**	**5,689**	**5,689**
Shipping and maritime transport	5,903	4,633	4,633
Marine Retail Services	287	252	252
Marine Manufacturing, Construction and Engineering	1,600	726	726
Marine Commerce	105	78	78
Total - Marine Renewable Energy	**891**	**1,077**	**1,148**
Offshore Oil and Gas	790	861	862
Offshore Renewables	101	216	286
Marine Tourism and Leisure	**5,836**	**3,502**	**3,502**
High-tech marine products and services	**350**	**391**	**457**
Total Marine Economy	**20,587**	**16,292**	**16,155**

‡: SEMRU Data from "*Ireland's Ocean Economy*", Ref Year 2007, (2010) and Ref year 2010 (2013)
*: 2014 baseline estimates, developed by PACEC, based on the 2010 SEMRU data

The demand for skills arises from two sources, namely:

- Expansion Demand: additional employment owing to growth in the sector; and
- Replacement Demand: the replacement of workers arising from exits to inactivity and net losses from inter-occupational movements.

Three possible alternative demand scenario forecasts were developed for the main occupational categories broken down by expansion and replacement demand over the period 2014 – 2020.

The first scenario, called **Scenario 1** for each broad sector, assumed that the turnover targets set out in HOOW would be met by 2020. Consultations with industry stakeholders, informed by the economic background data gathered, were used to determine how this increase in turnover could be achieved, how the additional turnover would be distributed between the various sub-sectors and how employment would need to increase in order to generate this turnover.

A modelling exercise was then conducted using the information from the company interviews to estimate how the expansion demand would be distributed by occupational grade in each sub-sector over the period 2014-2020.

An estimation of the replacement demand was also conducted using data provided by the SLMRU (Skills and Labour Market Research Unit, SOLAS) and following the methodology used by them in the publication of the EGFSN National Skills Bulletin[56] on the exits from employment to economic

[56] http://www.skillsireland.ie/media/23072014-National_Skills_Bulletin%20_2014--Publication.pdf

inactivity and net losses from inter-occupational movements, which vary by occupation. Professional occupations have a lower rate of movement from employment to inactivity than operative or administrative occupations – intuitively, the length of a continuous career in an occupation requiring specialised high-level qualifications is longer than for those requiring entry-level qualifications. The data also takes account of movement between occupations, as there is a general tendency for net movement into management and associate professional occupations from others, corresponding to promotion within companies – without this correction, the number of managers required would be overestimated. The statistics are an overestimate of true retirement, as "economic inactivity" incorporates all those neither working nor seeking work, including those in full-time education, the long-term sick or injured, and people looking after households full-time.

An alternative scenario, **Scenario 2**, representing a no-growth scenario for Seafood and Bio-Products and a higher growth scenario for Energy were also developed. The no-growth scenario assumed lack of expansion in the aquaculture sub-sector and the high growth scenario assumed growth in the energy sector, in particular marine renewable energy.

The distribution of the future skills demand by occupation is presented for each of the five broad sectors and shows the distribution of the 2014 baseline estimate of FTE employees across the occupations, the expansion demand by occupation expressed as the actual number and as a percentage of the 2014 baseline estimate, the replacement demand also expressed as the actual number and as a percentage of the 2014 baseline estimate and finally the gross demand, i.e. the expansion plus the replacement demand

In addition to the initial telephone discussions and consultations with key stakeholders in Phase 1, follow-up consultations were conducted to validate the outcome of the forecasts of the future skills demand.

1.10 Report Structure

The Structure of the report is as follows:

Chapter 1 – Introduction

Chapter 2 – Seafood and Bio-Products

Chapter 3 – Maritime Transport, Shipbuilding and Services

Chapter 4 – Energy

Chapter 5 – Marine Tourism

Chapter 6 – Maritime Monitoring, Security and Surveillance

Chapter 7 – Summary of Skills Demands for Marine Economy

Chapter 8 – Recommendations

Chapter 2: Seafood and Bio-Products

Sub-sectors
▪ Sea Fisheries
▪ Marine Aquaculture
▪ Seafood Processing
▪ Marine Biotechnology and Bio-Processing

2.1 Economic Profile

In 2010, the Irish Seafood and Bio-Products sector had an estimated annual sales value of €745 million and exports increased by 14% in 2010 and by 13% in 2011[57]. As outlined in Food Harvest 2020, the Department of Agriculture believe that the potential exists to capitalise on strong demand to increase revenue to €1 billion by 2020[58].

The 2010 economic indicators for the sector are summarised in Table 2.1:

Table 2.1: 2010 Economic Indicators for the Seafood and Bio-Products Sector

Sub-sector	Direct Employment (FTE)	GVA (€millions)	Turnover (€millions)
Sea Fisheries	2,825	116	202
Marine Aquaculture	918	47	123
Seafood Processing	1,586	80	390
Marine Biotechnology and Bio-Processing	304	13	30
Total	**5,633**	**256**	**745**

Source: SEMRU, Ocean Economy Report 2013 (Ref. year 2010)

The Table 2.1 shows that GVA for the Seafood and Bio-Products sector in 2010 was €256 million while turnover was €745 million. In addition, direct employment in the Sea food and Bio-Products sector was 5,633; however this figure rises considerably if indirect employment is taken into consideration

The most recent official data is the 2010 data provided by SEMRU (Socio-Economic Marine Research Unit in NUIG). The first Ocean Economy Report, published in 2010, was based on the reference year 2007, at the height of the economic boom (2003 – 2007). The latest report, with a reference year of 2010 and published in December 2013, represents the lowest point of the economic contraction (2007 – 2010) and a significant decrease in activity. In order to develop forecasts of the future skills demand to 2020, baseline estimates for 2014 were produced[59], using additional sources of

[57] Harnessing Our Ocean Wealth: An Integrated Marine Plan for Ireland (2012) - http://www.ouroceanwealth.ie/Pages/default.aspx
[58] Food Harvest 2020- A vision for Irish agri-food and fisheries. http://www.agriculture.gov.ie/agri-foodindustry/foodharvest2020/
[59] The 2014 employment estimates were based on the SEMRU 2010 data which was the latest available data at the time. SEMRU are currently updating the 2010 data and will publish the 2012 figures later in 2015. The SEMRU publication will also present 2014 estimates but based on 2012 data.

information, such as: annual CSO (Central Statistics Office) employment trend data for broad sectors; Economic and Social Research Institute (ESRI) Medium Term Review (MTR) 2013 – 2020 and SOLAS Occupational Employment Projection 2020 (Jan 2014); results from company surveys; and discussions with stakeholders. For sub-sectors aquaculture and seafood processing, the best estimate of 2014 employment is the 2010 figure as they had lost employment during the recession and may have continued to do so beyond 2010, but recent evidence was of a recovery. Marine biotechnology and bio-processing grew during the recession and this growth rate has continued. Sea fisheries apparently grew in employment during the recession, but this was accompanied by a substantial fall in turnover; the consensus position was that 2014 employment was likely to be below that estimated in 2010 and the midpoint between the 2007 and 2010 figures has been used as the 2014 baseline.

Table 2.2: Seafood and Bio-Products profile – FTE Direct Employment 2007, 2010, 2014 (estimated)

Sub-sector	2007‡	2010‡	2014*
Sea Fisheries	2,200	2,825	2,513
Marine Aquaculture	1,061	918	918
Seafood Processing	2,090	1,586	1,586
Marine Biotechnology and Bio-Processing	264	304	342
Total	**5,615**	**5,633**	**5,359**

‡: SEMRU Data from "*Ireland's Ocean Economy*", Ref Year 2007, (2010) and Ref year 2010 (2013)
*: 2014 baseline estimates, developed by PACEC, based on the 2010 SEMRU data

Locations of employment are widely distributed around the coast of Ireland. Areas which offer employment in all sub sectors (Fisheries, Aquaculture, Processing and Biotechnology) are Donegal, Galway, Kerry, Mayo, Cork, Waterford and Dublin.

2.1.1 Sea Fisheries

Catching of wild fish is regulated at national and EU levels under the Common Fisheries Policy (CFP), which sets annual catch quotas for most fish species. Primary responsibility for the allocation and management of these quotas rests with the Department of Agriculture, Food and the Marine (DAFM). The Irish Presidency of the Council of the European Union (January to June 2013) secured agreement on reform of the CFP in May 2013. It is the first major reform since 2002 and includes measures to prevent over-fishing, i.e. fishing at Maximum Sustainable Yield (MSY) levels and puts an end to the controversial practice of discarding fish which was estimated to comprise 23% of total catches in 2013. Under the obligation all catches have to be kept on board, landed and counted against quotas. Undersized fish cannot be marketed for human consumption purposes.The new CFP came into effect on January 1st 2014.

Profitability of the fisheries sector is heavily impacted by trends in fuel costs, global trade patterns and world prices for seafood products. The potential for the sector lies in adding value to the existing catch. This can be achieved by rebuilding and management of the stocks to enable higher fish quotas in line with the CFP MSY obligations. Increases in oil prices will affect the profitability of

the Irish fleet's landings, however, for non-Irish vessels fishing in the Irish Exclusive Economic Zone (EEZ) and which catch in the region of 88% of the fish caught in this zone it will be more advantageous for these non-Irish vessels to land in Ireland thereby increasing the supply of raw materials for the sea-food processing sub-sector.

Under the CFP Member States also have to ensure that their fleet capacity is in balance with the fishing opportunities. Currently this is not an issue for the Irish Fishing fleet which comprised of 1,914 fishing vessels in 2013. (There were 2,119 vessels in 2010 and 1,710 in 2007).

In 2010 the fisheries sector employed 2,825 FTEs most of which are concentrated along the Western seaboard. It is not anticipated that there will be any major changes in employment in this sub-sector over the reference period (2015 – 2020). The age profile of crewmembers is such that a higher proportion of older crewmembers are in the inshore sector. Approximately 30% of crew in the inshore sector are over 50 years of age, compared to less than 15% for the rest of the fleet. The highest proportion of crew in the 16 – 20 age categories is also in the inshore sector (approx. 15% compared to less than 5% for the rest of the fleet), indicating a strong family involvement in the inshore sector, and also partially explaining the high part-time component of this sector[60].

2.1.2 Marine Aquaculture

Marine aquaculture in Ireland comprises of finfish (mainly salmon) and shellfish (predominantly mussels and oysters). Currently, aquaculture in Ireland is primarily shellfish production comprising of 850 licensed operations covering 2,000 sites. The turnover for aquaculture in 2010 was €123 million. Turnover increased between 2007 and 2010 by 16% largely attributed to an increase in unit value per tone of the salmon and oyster industry. The value per tonne of production for salmon is approximately three times that for finfish, (Table 2.6). Currently approximately 68% of production is exported.

The sector is mainly comprised of part-time workers. In 2012 there were 1,023 part-time workers compared with 693 full-time workers[61]. The number of active enterprises engaged in marine aquaculture has remained stable with a total of 292 enterprises[62]. However, there is significant scope for aquaculture expansion in Ireland but Ireland needs to and is addressing difficulties with regard to compliance with the Birds and Habitats Directives before the true potential of the aquaculture sector can be realised. This potential also includes deep water sites and it is estimated that each new large-scale deep water salmon farming site could generate an extra €100 million in exports per annum.

Food Harvest 2020 has set an ambitious target for the aquaculture sector of a 78% increase in production by 2020.

2.1.3 Seafood Processing

The Irish seafood processing industry is mostly comprised of small enterprises with less than 10 employees. Only 12% of Irish processing companies had more than 50 employees in 2010. In 2011, there were an estimated 169 companies engaged in the handling, processing, distributing and

[60] EU - Ireland, National Strategic Plan, The Fisheries Sector 2007-2013
[61] BIM Strategy 2013-17
[62] Marine Agencies & Programmes Division: Dept. of Agriculture, Food & the Marine EMFF Union Priority 2 – Context (provided to RSM McClure Watters 2014)

marketing of seafood in Ireland of which approximately 25 of these companies account for approximately 60% of the total turnover.

Shellfish companies accounted for the largest number of seafood processing companies. The industry is concentrated in the coastal regions of Donegal, Mayo, Galway, Kerry, Cork and in the South East. It is facing limitations on raw material supply and the need to scale-up to meet demand in competitive export markets. Almost 70% of output is exported to markets including: France, UK, Spain, Italy Germany, Russia, Nigeria and Egypt.

2.1.4 Marine Biotechnology and Bio-Processing

Ireland's emerging Marine Biotechnology and Bio-Processing sub-sector is currently focused on seaweed harvesting. In 2011 the seaweed and biotechnology sector was estimated to be worth €18 million per annum and processed 36,000 tonnes of seaweed (wild product)[63]. In 2010 this sector employed 304 FTEs, which is an increase of 15% from 2007.

The use of seaweed in non-food applications is increasing, with clearly defined markets for seaweed as dietary supplements; over-the-counter medicines and pharmaceuticals; animal feeds; in agriculture and horticulture; as an aquaculture feed; as the basis of bioremediation and for use in cosmetics. Seaweeds are increasingly being recognised as a source of novel bioactive compounds with applications in pharmaceutical and functional foods, many of which are only being discovered.

The product source is currently limited to the wild resource and the product range is limited to high volume, low value products. Moving away from the more traditional wild species and applying aquaculture techniques to create sustainable year round supply is essential if the industry is to grow[64].

2.2 Company Interviews

This section details the findings from the 15 companies interviewed from the Seafood and Bio-Products sector. There was a total of 798 employees within the companies interviewed representing approximately 15% of the total employment of 5,359 FTEs in the seafood and bio-products sector in Ireland.

It is important to note that all the statistics in this section refer only to the companies interviewed and should not be extrapolated to the entire sector.

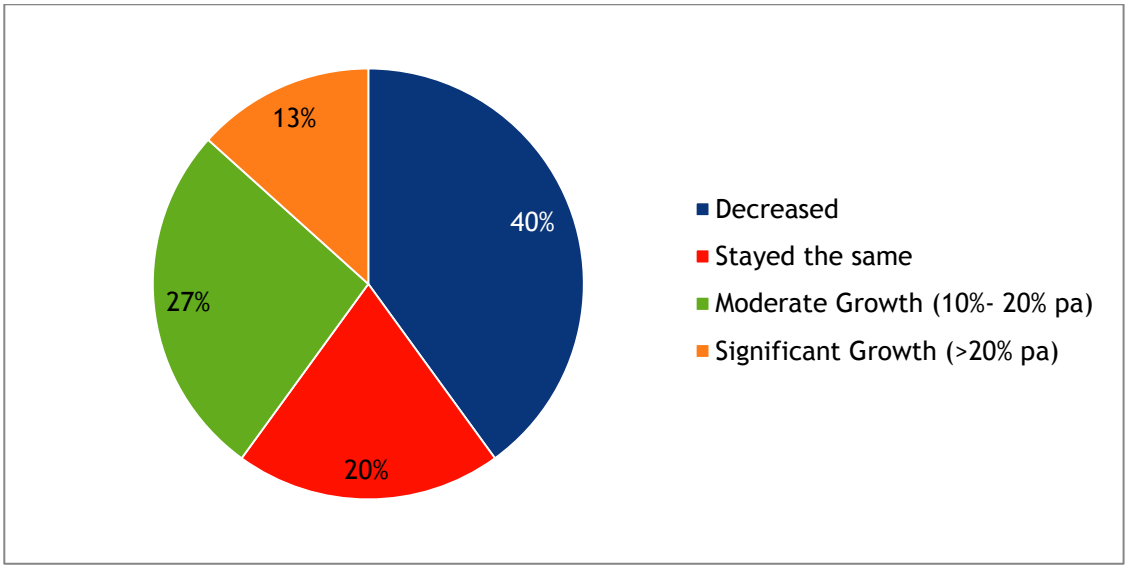
2.2.1 Turnover and Exports

Figure 2.1 shows that of the 15 companies interviewed in the Seafood and Bio-Products sector, six companies (40%) stated that turnover had decreased over the last three years while four (27%) stated turnover had grown moderately (increased by approx. 10%-20% per annum) over the last three years.

[63] Morrissey et al., 2011

[64] http://www.bim.ie/media/bim/content/publications/corporate-other-publications/A%20Market%20Analysis%20towards%20the%20Further%20Development%20of%20Seaweed%20Aquaculture%20in%20Ireland.pdf

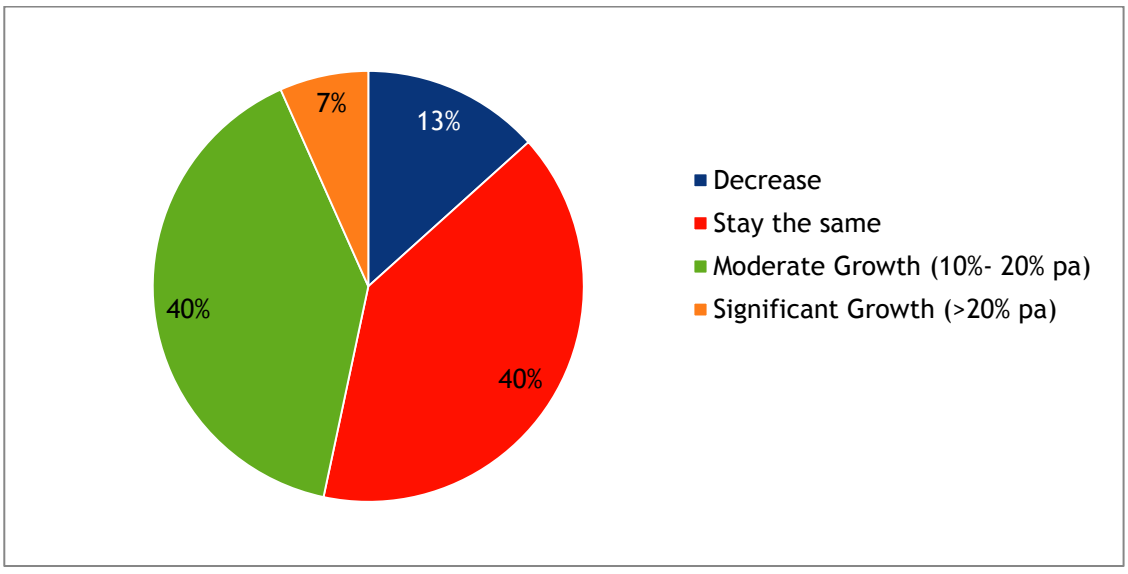
Figure 2.1: Percentage of Companies that experienced a Change in Turnover over the last 3 Years in the Seafood and Bio-Products sector



Source: Company interviews – RSM McClure Watters, 2014

Figure 2.2 shows the levels of export growth anticipated over the next six years by the companies interviewed. Six companies (or 40% of the sample) each expected levels of export growth to stay the same or grow moderately (increase by approx. 10%-20% per annum). The interviews with the companies also found that on average, over the last three years approximately 67% of the turnover was from exports.

Figure 2.2: Anticipated Export Growth over the next 6 Years in the Seafood and Bio-Products sector



Source: Company interviews – RSM McClure Watters, 2014

2.2.2 Employment Growth / Decline by Occupation

Companies were asked about their employment growth by occupation over the last three years and their anticipated growth for the next six years. Examples of job roles by occupation within the Seafood and Bio-Products Sector are outlined in the Table 2.3.

Table 2.3: Job Roles by occupational level in the Seafood and Bio-Products Sector

Occupation Level	Job Roles
Operative Grades	General Operatives, Boat Crew, Deckhands, Riggers, Food Production/Process operatives, e.g. Fish Filleters
Administration	HR staff, General Administrators, Receptionists
Skilled Trades	Radio Operators, Production Supervisors, Maintenance Technicians, Mechanics, Electricians, Plant Operators, Maintenance and repair of fishing gear, Boat builder, Skippers - Deck Officer (Fishing Vessel), Fishermen, Divers
Associate Professional & Technical	Production and Process Development Technicians, Pollution Control Personnel, Safety Officers, Quality Assurance Technicians, Lab Technicians, Market Development Staff, Nature Conservationists,
Professionals	Marine scientists, Marine biologists, Fishery Scientists, Microbiologists, Botanists, Earth & Ocean scientists, Geneticists, Food Chemists, Food Technologists, New Product Development Technologists, Food Process Engineers, Chemical Engineers, Environmental Scientists, Marine Spatial Planners, Fish Veterinarians, Quality Auditors, Food Economists, Engineering Officers (Fishing Vessel)
Management	Managing Directors, Plant Managers, Accountants, Production Managers, Legal Professionals, Marketing Professionals

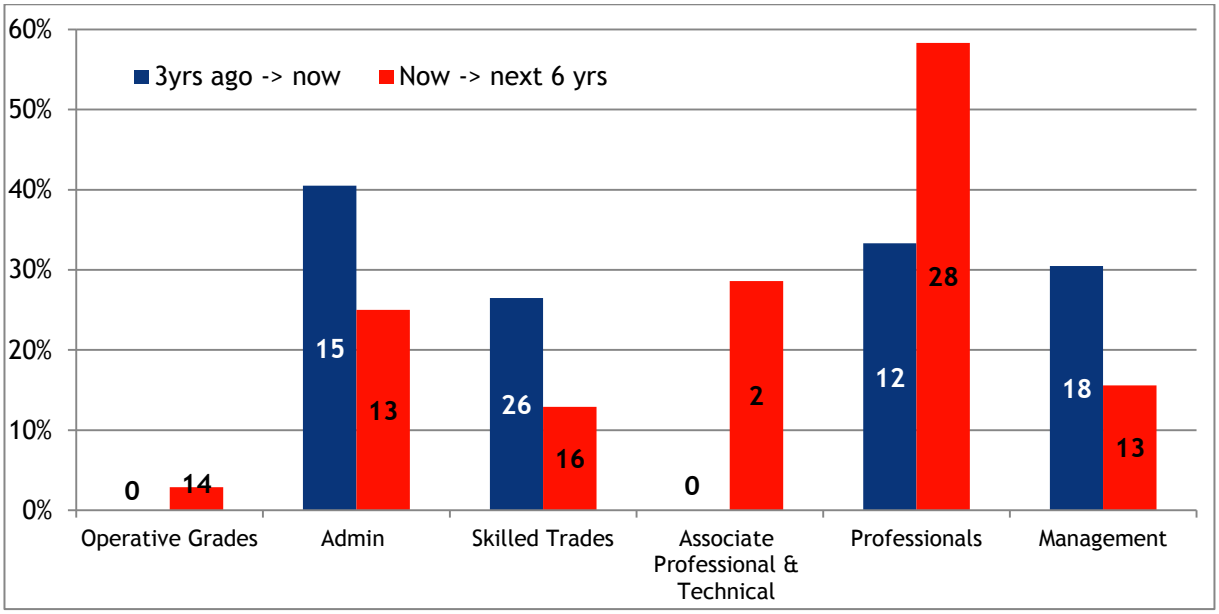
Source: Our Ocean Wealth – Background Briefing Document, Part III, Enablers - Getting the Conditions Right for Growth (2012)

Figure 2.3 shows that there has been some employment growth in most occupations over the last three years, with the exception of Operative Grades and Associate Professionals and Technical.

Over the previous three years these companies have seen their greatest expansion in the Administrative, Professional and Management Occupations (40%, 33%, 30% respectively), although the numbers are small at 15, 12, 18 respectively. Over the next six years, companies anticipated a continued expansion for these occupations, in particular for Professionals with a 58% expansion (28 persons).

The companies interviewed indicated that many young people are over qualified and do not want to do the manual labour that is required at operative level.

Figure 2.3: Employment Growth within the Seafood and Bio-Products Sector*



Source: Company interviews – RSM McClure Watters, 2014

* Values are calculated as a percentage of growth from 3 years ago to now and now to the next 6 years, within specific occupations. The numbers stated in the above figure represent the number of employees companies have stated they have gained from 3 years ago to now and will need from now to the next 6 years.

2.2.3 Current and Required Skills Levels

Companies interviewed were asked about the current and future qualifications under the National Framework of Qualifications (NFQ) that they would require for the different occupations, (Table 2.4). The NFQ is detailed in Appendix 4.

While the number of employees within each category is, in some cases, very small and therefore the results may not be representative of the sector an interesting change is emerging which is seen across all the sectors of the marine economy, namely the increase in qualifications for Professionals, Managers and Administrators.

Two thirds of those employed as operatives have between Level 4 -5 and it is not anticipated that this will change. The almost 20% of the operative cohort with less than NFQ Level 4, is a legacy issue and comprises the older personnel who left school early and started work in the fishing industry. Over time as these people retire the percentage with this low educational attainment would be expected to significantly reduce with an associated increase in Level 4-5.

The cells shaded green in Table 2.4 are those for which a significant increase in NFQ level is anticipated. The occupation levels are Administration, Professionals and Managers. This implies an increase in the professionalisation of the sector with the focus on the development of the managers and professionals to lead, manage and expand the sector, develop new products, focus on exporting to international markets and meet all the changing environmental and regulatory requirements.

Table 2.4: Current and anticipated NFQ Levels required by Occupation in Seafood and Bio-Products

Occupation	NFQ Level											
	Number		<4		4-5		6-7		8		9-10	
	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future
Operative Grades	454	468	18%	19%	**68%**	**67%**	13%	13%	1%	1%	0%	0%
Administration	58	71	0%	0%	58%	45%	33%	29%	**7%**	**25%**	2%	1%
Skilled Trades	139	155	8%	7%	51%	62%	40%	29%	1%	2%	0%	0%
Associate Professional and Technical	7	9	0%	0%	0%	0%	**67%**	**67%**	33%	33%	0%	0%
Professionals	54	82	0%	0%	0%	0%	36%	21%	**33%**	**57%**	32%	23%
Management	86	99	0%	0%	44%	30%	29%	26%	22%	28%	**5%**	**16%**
Total	**798**	**884**										

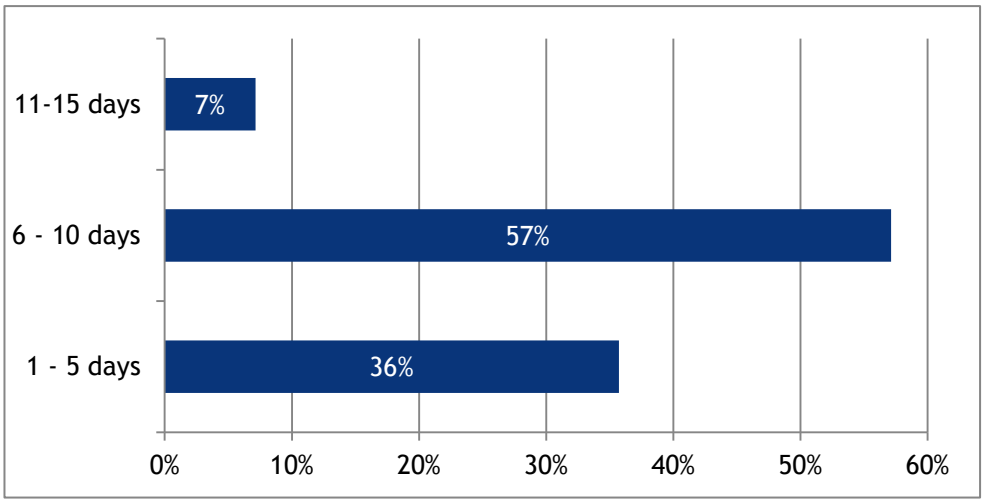
Source: Company interviews – RSM McClure Watters, 2014

Cells shaded indicate no significant change in NFQ level required for the occupation, while cells shaded indicate a higher NFQ level required and cells shaded indicate a corresponding decline in NFQ required

2.2.4 Training and Development

The companies were also asked about training provision for their employees. Figure 2.4 shows that for the Seafood and Bio-Products sector over half the companies interviewed (57%) provided between 6-10 training days a year per employee.

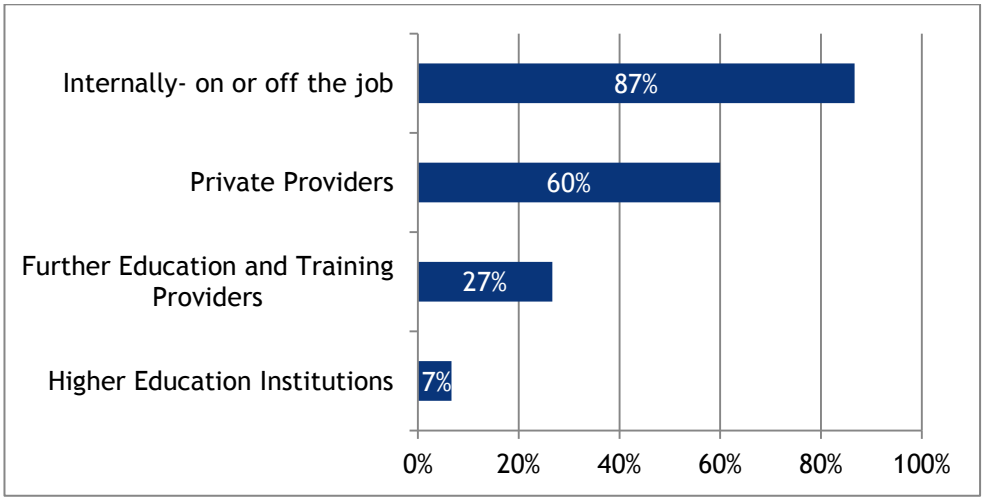
Figure 2.4: Number of Training Days in the Seafood and Bio-Products sector



Source: Company interviews – RSM McClure Watters, 2014

Figure 2.5 shows that 87% of companies interviewed used internal training and 60% used private providers.

Figure 2.5: How Training was delivered in the Seafood and Bio-Products Sector



Source: Company interviews – RSM McClure Watters, 2014

2.2.5 Availability of Personnel

Companies were asked about the availability of personnel with the relevant education, skills and expertise. A summary of the results is outlined in Table 2.5.

Table 2.5: Availability of Personnel for the Seafood and Bio-Products sector

	Not enough people in my local area with right level of:					
	Education		Experience		Skills	
	N	%	N	%	N	%
Operative Grades	5	33%	6	40%	6	40%
Administration	1	7%	1	7%	1	7%
Skilled Trades	2	13%	2	13%	4	27%
Associate Professionals and Technical	1	7%	2	13%	2	13%
Professionals	1	7%	2	13%	2	13%
Management	2	13%	2	13%	2	13%
Base= 15						

Source: Company interviews – RSM McClure Watters, 2014

Table 2.5, indicates that companies have the most difficulty finding operatives (pink shaded cells). One company stated that people in their area are over qualified and do not want to do the manual labour involved. Many of the companies are located in coastal communities which are experiencing high unemployment, therefore, the difficulty finding operative is likely a reflection of the unattractive nature of the work. The rural location can also present a difficulty in finding operatives. However, it is important to note also that responses to many of the question are too low to draw definitive conclusions.

2.3 Stakeholder Consultation and Analysis

The central issue that stakeholders highlighted in all the discussions that took place was the difficulty surrounding the issuing of licenses because of the challenges on the State regulatory structure in achieving compliance with the Birds and Habitats Directives. This has created a perceived uncertainty for the industry and resulted in a cautious approach to development of the sector. However, notwithstanding this difficulty for the industry a number of skills issues were identified.

The first relates to the sea fisheries sub-sector and its ageing workforce. This will require some form of "succession strategy" to be developed and put in place to ensure that the onshore fishing workforce can be replaced as existing employees retire.

The second issue was the exporting to Asia and the US markets as well as the existing traditional EU markets as this will require language and cultural awareness skills and international marketing and business skills for the Irish seafood producers at management level.

Quality of exports will also become increasingly important and ensuring wastage, such as transport of dead shellfish, is minimised, and logistics skills are particularly important in management roles.

In aquaculture, increased demands for energy and environmental monitoring, linked to new EU regulations means that many professional staff will need to be skilled in these areas.

2.4 Future Demand for Seafood and Bio-Product Skills, 2015 - 2020

2.4.1 Introduction

This section of the report deals with the future demand for skills in the Seafood and Bio-Product sector over the period 2015-2020, arising from growth of the sector and replacement of workers arising from exits to inactivity and net losses from inter-occupational movements, referred to as expansion and replacement demand respectively.

Scenario 1 assumes that the turnover targets of an increase from €0.7bn to €1bn set out in HOOW will be met by 2020. By taking these targets and translating them into numbers of jobs, the demand for skills for the different jobs out to 2020 is forecast. Consultations with industry stakeholders, informed by the economic background data gathered, were used to determine how this increase in turnover could be achieved, how the additional turnover would be distributed between the various industries making up the Seafood and Bio-Product sector and how employment would need to increase in order to generate this turnover. A modelling exercise was then conducted using the information from the company interviews to estimate how the expansion demand would be distributed by occupational grade in each sub-sector over the period 2015-2020.

An estimation of the replacement demand was also conducted using data provided by the SLMRU (Skills and Labour Market Research Unit, SOLAS) and following the methodology used by them in the publication of the EGFSN National Skills Bulletin[65] on the exits from employment to economic inactivity and net losses from inter-occupational movements, which vary by occupation.

2.4.2 Scenario 1: Achieving the HOOW targets

2.4.2.1 Scenario 1 Summary

A forecast of employment was developed, in consultation with stakeholders, based on a growth scenario for aquaculture and which assumes that the HOOW target of €1billion turnover in Seafood and Bio-Product sector by 2020 will be met. The premise of Scenario 1 is that the increase in turnover will be driven by investment in Aquaculture, leading to increased output, turnover, and employment. Expansion of aquaculture will drive the expansion in seafood processing through increased raw material supply which in turn will have an impact on turnover and employment in the Seafood Processing industry.

2.4.2.2 Aquaculture Background

Consultations with stakeholders indicated that aquaculture production is currently around 36,000 tonnes, which includes around 12,000 tonnes of salmon. The targets set out in Food Harvest 2020 represent an output of approximately 85,000 tonnes by 2020. Ireland's salmon production previously peaked at 24,000 tonnes in 2001 and could be replicated again.

One source of expansion is the development of the existing network of conventional sites to increase productivity and output and in particular for one of the large aquaculture companies with sufficient resources, i.e. juvenile fish stock and finance to increase its salmon production from 6,500 tonnes to 18,000 tonnes by 2020 which would increase Full Time Equivalent (FTE) employment by 268.

The expansion of the existing network would not be sufficient to meet the HOOW targets, therefore, in the development of the scenarios cognisance was taken of the expansion potential arising from large offshore deep-water sites for salmon production which have higher productivity and lower employment per tonne of production than the existing industry average. However, in the development of the scenario only one of these off-shore farms is factored in. To quantify the value of one such deep-water off-shore salmon farm a potential output of 15,000 tonnes, could provide 350 direct jobs, of which approximately 65 of those jobs would be on the farm itself, with others in rearing juvenile fish, processing the fish after harvest, and transportation. In addition to the direct employment in the aquaculture sector, a further 150 jobs will be needed in associated industries, and these will be slightly more remote from the project location, which means that its employment benefits will spread beyond the immediate area.

The discussions with stakeholders focused on levels of production (tonnage) and the impacts on employment and turnover for a given increase in tonnage. It was necessary to establish the relationship between tonnage, turnover, and employment, so that the tonnage estimates could be

[65] http://www.skillsireland.ie/media/23072014-National_Skills_Bulletin%20_2014--Publication.pdf

converted into turnover, for comparison with the HOOW target, and employment, for analysis of future skills demand.

To translate the HOOW €1 billion turnover target to tonnage Table 2.6 was developed using the unit of turnover per tonne of production of approximately €6,000 for finfish and €2,000 for shellfish. The current (2014) figure of jobs per tonne of production is likely to be similar to 2012 figures given that production levels are similar in scale. We have used a standard ratio of 40 tonnes of production per full-time equivalent employee (provided by stakeholders), to convert tonnage to employment.

Table 2.6: Aquaculture Production 2012

	Tonnes	€000
Finfish[66](e.g. salmon, trout)	13,880	83,830
Shellfish[67]	22,820	48,940
Total	36,700	132,770

Source: BIM Strategy 2013-2017

The stakeholder consensus on the 2014 baseline position relative to 2010 (informed by the economic data) was that employment in aquaculture and seafood processing would be broadly similar to that in 2010, that sea fisheries employment would be between its 2007 and 2010 positions as reported by SEMRU, and that the emerging marine biotechnology and bio-processing sector (which had grown during the recessionary period 2007-2010) would have continued to grow between 2010 and 2014. (Table 2.2)

2.4.2.3 Assumptions for Seafood and Bio-Products: Scenario 1

Aquaculture

Under this scenario, the growth of the aquaculture sector would need to be to a total of 80,000 tonnes of production in 2020, made up of:

- 18,000 tonnes of salmon from a single large existing business (requiring 420 FTE employees) (value = €108m);
- 15,000 tonnes from one an off-shore farm (requiring 350 FTE employees) (value = €90m);
- 18,000 tonnes of salmon from other small producers (employment levels as per existing FTE per tonne= 450 FTE)(value: €108m); and
- 29,000 tonnes of shellfish (requiring 725 FTE employees) (value = €58m).

Therefore total aquaculture value (turnover) in 2020 would equate to €364m with employment as per BIM profiles for finfish and shell fish to rise to 1,945 in 2020.

[66] Value of finfish approximately €6,000 per tonne
[67] Value of shellfish approximately €2,200 per tonne

Sea Fisheries

Fisheries are expected to remain between 2007 and 2010 figures, with turnover equating to approximately €200-250m and employment between 2,200 (2007 level) and 2,825 (2010 level) at 2,513.

Seafood Processing

Seafood processing will make up the residual growth of €410m to reach the HOOW target of €1bn. Employment in seafood processing will rise from approximately 1,600 to 1,916 in 2020 (this is a growth rate of 1.9% per annum from 2010, and is consistent with capacity as demonstrated by the 2007 level of employment at 2,090). Seafood processing growth will be facilitated by the following:

- The increased availability of raw materials from aquaculture;
- The focused efforts to attract landings from other international fishing fleets active in Irish waters; and
- New facilities, for example the "Bio-Marine ingredients" facility planned for Killybegs, utilising the available catch for producing higher value products.

Marine biotechnology and bio-processing

For the purposes of this study, marine biotechnology and bio-processing is included as part of the broader seafood/aquaculture sector. Based on observed growth in the bio-technology/bio-processing sector even during the recessionary period, 2007-2010[68], and evidence on growth in science jobs in general from the wider economy[69], turnover in this sector is projected to rise from €30m in 2010 to €40m in 2020, and direct FTE employment will rise from 342 in 2014 to 408 in 2020.

The evidence from stakeholder consultations was that the aquaculture production targets set in Food Harvest 2020 of 80,000 tonnes are very challenging and seem unlikely to be realised by the 2020 timeline, though a number of large salmon farms, if licensed, would have a major impact. Hence, an overall target of 80,000 tonnes is used to reflect a strongly performing aquaculture sector, with other sections of the seafood sector, mainly processing, making up the gap to achieve the overall HOOW target of €1bn. This growth in aquaculture would not be sufficient to achieve the overall HOOW target of €1bn of itself; we have assumed that the growth in aquaculture would have an indirect impact on employment in the seafood processing sector as a result of the increased raw material supply. In this way, we have constructed a scenario in which turnover rises to meet the overall HOOW target of €1bn and there is sufficient employment growth to provide this turnover (with turnover per employee held constant).

[68] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013

[69] Annual growth of 0.6% in scientific occupations is forecast by Occupational Employment Projections 2020 (SOLAS)

Table 2.7: Turnover and FTE 2020 values for Seafood and Bio-Products for Scenario 1

Sub-Sector	Production to meet the HOOW 2020 targets	2020 Value	2020 FTE	2014 FTE	Expansion demand
Aquaculture	18,000 tonnes from one large existing farm	€108m	420	-	
	15,000 tonnes from one new offshore farm	€90	350	-	
	18,000 tonnes from other small producers	€108	450	-	
	29,000 tonnes of shellfish	€58m	725	-	
Aquaculture Total		**€364m**	**1,945**	918	**1,027**
Sea Fisheries	Values mid-point between 2007 and 2010	**€225m**	**2,513**	2,513	**0**
Seafood Processing	Increased raw material supply	**€410**	**1,916**	1,586	**330**
Seafood Total	As per target in HOOW	**€999m**	6,374	5,017	
Marine Biotechnology and Bio-Processing	Based on biotechnology growth	€40	408	342	**66**
Total for Seafood and Bio-Products	**All 4 sub-sectors as set out for this study**	**€1.39bn**	**6,782**	5,359	**1,423**

Source: PACEC, 2014

2.4.3 Employment and Skills Implications

The above scenario forecasts an expansion demand of 1,423 jobs to 2020. The distribution of the 1,423 additional FTE jobs by occupation level is shown in Table 2.8 below. The first column shows the 2014 FTE baseline estimate by occupation level. The next set of columns presents the expansion demand, the percentage of that figure to the 2014 baseline estimate for that occupation level and the percentage of the occupation expansion to the total expansion demand. Then follows the replacement demand - those leaving, e.g. due to retirement or change of occupation. The gross demand is the sum of the expansion and replacement and is the true reflection of the skills demand for the sector. Summed across the period 2015-2020, the total number of workers leaving is estimated to be 2,094 FTEs, known as the replacement demand, which when summed with the expansion demand of 1,423 FTEs gives a gross demand of 3,517 FTE employees.

Table 2.8: Distribution of Expansion and Replacement demand by occupation level for **Scenario 1** for **Seafood and Marine Bio-Products**

Occupation Level	2014 Baseline Estimate	% 2014 Total Baseline	Expansion Demand 2014-2020		% of Expansion demand	Replacement Demand 2014-2020		% of Replacement demand	Gross Demand		% of Gross demand
			No.	% of 2014		No.	% of 2014		No.	% of 2014	
Operatives	3,043	57%	514	17%	36%	1,296	43%	62%	1,810	59%	51%
Administrative	392	7%	180	46%	13%	179	46%	9%	359	92%	10%
Skilled Trades	934	17%	237	25%	17%	344	37%	16%	581	62%	17%
Associate Professionals & Technical	45	1%	0	0%	0%	10	22%	0.4%	10	22%	0.3%
Professionals	365	7%	373	102%	26%	129	35%	6%	502	138%	14%
Managers	580	11%	119	21%	8%	136	23%	6%	255	44%	7%
Total	**5,359**		**1,423**	**27%**		**2,094**	**39%**		**3,517**	**66%**	

Source: PACEC, 2014

While operatives are the largest occupation within the Seafood and Bio-Products sector, at 57% of the total workforce, and therefore not surprisingly also has the largest expansion demand in actual numbers, it is professionals that have the largest percentage increase (102%) with a requirement of 373 additional professionals by 2020. This reflects the trend of greater professionalisation of the sector.

What is also significant is the fact that 39% of the current workforce in the Seafood and Bio-Products sector will need to be replaced in addition to the 27% needed for the expansion of the sector.

The replacement demand for operatives, at 62% of the total replacement demand, is consistent with the fact that there is a higher churn among the lower skilled occupations than for professionals and managers which are each at 6% of the replacement total.

2.4.4 Scenario 2: No growth in Aquaculture

For the purposes of this report we have considered a no-growth scenario where the anticipated growth in aquaculture does not occur owing to continuing uncertainty within the industry arising from the licensing difficulties that have existed. In Scenario 1, growth in the broad Seafood and Bio-Products sector is primarily driven by significant expansion in aquaculture, with an indirect effect on growth in seafood processing (which would benefit as the aquaculture sector supplies fish for processing). In this no-growth scenario, we have considered the skills impact if, in the absence of growth in employment in aquaculture and employment in all the other sub-sectors were to remain constant over the period 2015-2020, then the only driver of skills demand would be the replacement demand. The expansion component of demand is therefore zero for all occupations under the

alternative scenario. By the end of the forecast period, the replacement demand is higher in the high-growth scenario than the no-growth scenario simply because the sector is bigger but the rate of attrition is the same. As a result, the total replacement demand in this alternative scenario is lower than the high-growth scenario and is 2,084 FTEs of which 1,328 jobs are for operatives and comprise 64% of the total gross demand. Skilled Trades is next at 341 jobs or 16% of the gross demand. Again this reflects the low skill nature of the seafood and bio-products sector.

Table 2.9: Distribution of Expansion and Replacement demand by occupation level for the "no-growth" Scenario 2 for Seafood and Marine Bio-Products

Occupation Level	2014 Estimate	Expansion Demand 2014-2020		Replacement Demand 2014-2020		Gross Demand		
	Baseline	No.	% of 2014	No.	% of 2014	No.	% of 2014	% of Gross demand
Operative Grades	3,043	0	-	1,328	44%	1,328	44%	64%
Administration	392	0	-	166	42%	166	42%	8%
Skilled Trades	934	0	-	341	37%	341	37%	16%
Associate Professional & Technical	45	0	-	11	24%	11	24%	1%
Professionals	365	0	-	100	27%	100	27%	5%
Management	580	0	-	137	24%	137	24%	7%
Total	**5,359**	**0**	**-**	**2,084**	**39%**	**2,084**	**39%**	

Source: PACEC, 2014

2.5 Supply Side Information

Bord Iascaigh Mhara (BIM) is the national agency with responsibility for training in the seafood sector. It has dedicated facilities through the National Fisheries College of Ireland (NFCI) at Greencastle, Co. Donegal and at Castletownbere in Co. Cork. It also provides short-training courses at other locations around Ireland and has a mobile training unit which provides hands-on training at local level. BIM is also increasing its capacity to provide courses by expanding facilities at Crofton Road, Dun Laoghaire to cater for demand on the East coast. BIM also plans to provide Seafood Business Management courses in future in partnership with selected third level institutions in its Seafood Development Centre (CDC) at Clonakilty, Co. Cork.

BIM's courses cover a variety of disciplines namely:

- Fishing – Skipper and Crew
- Marine Engineering
- Aquaculture

- Processors and Retailers
- Green Seafood Business Programme
- Sea Safety training
- Radio
- Passenger Boats

Table 2.10 lists the courses for fishing, marine engineering, aquaculture and seafood processors and retailers. Courses dealing with sea safety, radio and passenger boats are dealt with under Maritime Transport, Shipbuilding and Services as they are generic courses, internationally accredited and are relevant across multiple sub-sectors of the marine economy.

Table 2.10: List of BIM Training Courses

Course Title	Institution	Award	Duration
Fishing - Skipper and Crew			
Commercial Fishing	BIM - Dun Laoghaire	QQI	6 months
Skipper - Second Hand Limited Certificate	BIM - Dun Laoghaire, Donegal & Castletownbere	DTTAS - Fishing Vessel Cert of Competency	12 weeks
Skipper - Second Hand Full Certificate	BIM - Dun Laoghaire, Donegal & Castletownbere	DTTAS - Fishing Vessel Cert of Competency	16 weeks
Skipper - Full Certificate	BIM - Dun Laoghaire, Donegal & Castletownbere	DTTAS - Fishing Vessel Cert of Competency	14 weeks
Navigation Control (Fishing)	BIM - Dun Laoghaire, Donegal & Castletownbere	DTTAS - Fishing Vessel Cert of Proficiency	2 weeks
Electronic Navigation Systems (Fishing)	BIM - Dun Laoghaire, Donegal & Castletownbere	DTTAS - Fishing Vessel Cert of Proficiency	105 hrs
E-learning Navigation & Stability (Fishing)	BIM - Dun Laoghaire	QQI	120 hrs
Marine Engineering			
Engineer Officer (Fishing Vessel)	BIM - Donegal + 1 yr on board a commercial fisshing vessel	DTTAS - Class 3 Cert of Competency Engineer Officer (Fishing Vessel)	1 + 1 yrs
Marine Engineering Processes	BIM - Castletownbere	QQI	3 weeks
Aquaculture			
Aquaculture	BIM - Dun Laoghaire	QQI - Level 3	20 hrs
Aquaculture	Galway-Roscommon ETB-Letterfrack, Rosmuc, Aran	QQI - Level 3	20 hrs

Course Title	Institution	Award	Duration
	Islands		
Aquaculture	BIM - Dun Laoghaire	QQI – Level 4	30 hrs
Aquaculture	Galway-Roscommon ETB-Letterfrack, Rosmuc, Aran Islands	QQI -Level 4	30 hrs
Aquaculture	BIM - Castletownbere	QQI – Level 5	4 months
Aquaculture	Galway-Roscommon ETB-Letterfrack, Rosmuc, Aran Islands	QQI – Level 5	4 months
Farmed Fish Welfare	BIM - Dun Laoghaire	QQI – Level 6	1 week
Seaweed On-growing	BIM - Dun Laoghaire	QQI -Level 5	3 weeks
Seafood Processing and Retailers			
Fish Handling & Filleting	BIM - Clonakilty		2 days
Risk Based HACCP[70] for Seafood	BIM - Dun Laoghaire, Clonakilty	QQI	2 days
Seafood Hygiene Management	BIM - Dun Laoghaire, Clonakilty	QQI	1 day
Seafood Innovation	UCC (developed with BIM)	QQI -Level 7	2 yrs - 8 x Fri pm & Sat day
Green Seafood Business Programme			
Energy Management Training Programme for Small - Medium Seafood Processing Businesses	SEAI in partnership with BIM		2 workshops - 1.5 days

Source: List compiled by DJEI, Nov 2014

The National Fisheries College at Greencastle has its own fully equipped trawler deck, a training vessel (MV Lough Swilly) and a working 600hp marine diesel engine for engineering training. All the equipment is Department of Transport, Tourism and Sport (DTTAS) approved and specific for the training needs. BIM works closely with the Education and Training Boards (ETBs), formerly Vocational Educational Colleges (VECs), in delivering courses in remote rural areas and also works with Údarás na Gaeltachta in Irish speaking areas.

[70] HACCP - Hazard Analysis and Critical Control Point. HACCP is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product.

Accreditation for BIM's seafood courses is provided through the BIM Agreement with Quality and Qualifications Ireland (QQI). The Certificates of Competency and Proficiency for the fishing vessels are issued by the DTTAS following an examination.

Training courses are provided on a regular basis depending on demand. Information on the availability and dates of courses are on the BIM website[71].

Skillnets[72] funds and facilitates training through networks of private sector companies, in a range of sectors and regions. Each network delivers training that is driven by specific industry and member company needs. The Taste 4 Success Skillnet runs two training programmes relevant to the seafood industry, as shown in Table 2.11[73].

Table 2.11: List of "Taste 4 Success" Skillnet Training Courses

Course Title	Institution	Award	Duration
Fish Handling Skills - an Introduction	Taste4Success Skillnet - Cork	Short Course	5 days
Smoking Fish	Taste4Success Skillnet - Galway	Short Course	5 days

Source: List compiled by DJEI, Nov 2014

2.5.1 Higher Education – Degree Courses

Currently there are no degree courses in aquaculture. Degree courses used to be run in GMIT (Galway-Mayo Institute of Technology), LYIT (Letterkenny) and Tralee IT but the demand for the courses declined. GMIT now focuses on degree courses in Marine science which has modules in aquaculture and resource management (the latter being pertinent to fish farming). The provision of a broader Marine science degree with the possibility of specialising with a postgraduate qualification is more in keeping with the evolution in Higher Education in recent years. If the demand for a specialisation in aquaculture arose GMIT would be in a position to develop and offer an MSc in Aquaculture. A number of graduates from GMIT go to Stirling University in Scotland to undertake such a Masters.

Following a survey of aquaculture companies in the South East, where 50% of shellfish is produced, BIM is currently in discussion with Carlow Institute of Technology to develop a degree in Sustainable Aquabusiness as the companies they interviewed indicated there would be a demand for such graduates for their business and that it would enhance the seafood industry.

Another course worth mentioning is the MSc in Business Innovation Technology and Entrepreneurship, a one year, Level 9 course offered by Waterford Institute of Technology dedicated to transforming Science, Engineering and Technology graduates who will create and lead the businesses of tomorrow.

[71] http://www.bim.ie/training/

[72] Skillnets, which was established in 1999 and is funded from the National Training Fund (NTF) through the Department of Education and Skills (DES), actively supports and works with businesses in Ireland to address their current and future skills needs. http://www.skillnets.ie/

[73] http://www.skillnets.ie/network/taste4success-skillnet

2.5.2 Marine Science

Higher Education degree courses, at both undergraduate and postgraduate (NFQ Levels 7 – 10) which are "Marine" focussed are listed in the Table 2.12. Graduates from these courses are required across the entire Marine economy in off-shore energy; marine technology and marine tourism, so while listed in this section marine scientists are not limited to working solely in the seafood and bio-products sector.

Table 2.12: List of Third Level Marine Science Courses

Course	Institution	Award	Duration
Applied Freshwater and Marine Biology or Undenominated Science and choose Applied Freshwater and Marine Biology at end yr 1)	Galway-Mayo IT (Galway)-GMIT	BSc	3/4 years
Marine Science	NUI Galway	BSc	4 yrs
Earth and Ocean Sciences Science or – Undenominated Science and choose to major in Earth and Ocean Sciences	NUI Galway	BSc	4 yrs
Marine - Applied Marine Biological Sampling and data Collection	Galway-Mayo IT (Galway)-GMIT	Postgraduate certificate	2 weeks
Research Programmes - Marine and Freshwater Research Centre (MFRC)	GMIT	MSc	2 years
Research Programmes - Marine and Freshwater Research Centre (MFRC)	GMIT	PhD	Min 3 yrs
EMBC+ International MSc in Marine Biodiversity and Conservation (www.embcplus.org)	GMIT	MSc taught	2 years
MARES Joint Doctoral Programme on Marine Ecosystem Health and Conservation (www.mares-eu.org)	GMIT	PhD Structured	3 years
Coastal and Marine Environments: Physical Process, Policy and Practice	NUI Galway	MSc	1 yr
Marine – Structured PhD	NUI Galway	PhD	
Ryan Institute - Research (Ryan Institute for Environmental, Marine and Energy Research)	NUI Galway	MSc / PhD	
Earth and Ocean Sciences - Research	NUI Galway	MSc/ PhD	
Earth and Ocean Sciences –Structured PhD	NUI Galway	PhD	
Applied Science - Marine Biology	University College Cork - UCC	MSc	1 yr
Marine Biology Conversion Programme - a conversion course for non-biological/environmental graduates in order to	University College Cork - UCC	PGCert	6 months

Course	Institution	Award	Duration
progress to the MSc Marine Biology			
Coastal and Marine Management - Applied	UCC	MSc	1 yr
Marine Spatial Planning - eLearning	University of Ulster - Coleraine - UU	PgDip/MSc	
Marine Biology (with Professional Studies)	Queen's University Belfast - QUB	BSc Hons	2-3years
Marine Science with DPP /DIAS (International Academic Studies)	University of Ulster - Coleraine - UU	BSc Hons	3 (4) years
Coastal Zone Management - eLearning	University of Ulster - Coleraine - UU	PgDip/MSc	3 (4) years
Ecology Evolution Behaviour and Environmental Economics	Queen's University Belfast - QUB	PhD/MPhil	2-3years
Earth Science	Open University in Ireland	MSc	

Source: List compiled by DJEI, Nov 2014

2.5.2.1 SMART – Strategic Marine Alliance for Research and Training[74]

Another resource on the "supply side" is SMART - The Strategic Marine Alliance for Research and Training. SMART is a consortium of Higher Education Institutions and the Marine Institute, established in 2011, to develop and deliver practical off-shore training on board the national research vessels for students of marine-related science, technology and engineering. The consortium comprises GMIT, NUIG, UCC AIT, UU, and MI.

One of the objectives of SMART is to facilitate the creation of new skills and expertise which will be of direct benefit to science and industry, particularly in new and emerging technologies. Examples of SMART Training Programmes are as follows:

1. Multidisciplinary Offshore Operations in Marine Science

The national offshore blended learning module is an inter-institutional accredited module (5 ECTS - European Credit Transfer System) that provides undergraduate students (NFQ level 8) with the detailed knowledge, skill sets and expertise necessary to design, plan and execute a multidisciplinary research survey at sea.

The module is designed to introduce students from a variety of science backgrounds to the concept of utilising a multidisciplinary ecosystem approach to studying the marine environment using the core disciplines of oceanography, benthic ecology (ecology of the lowest level of the sea), fisheries biology and geosciences. Teaching focuses on the practical, cross-disciplinary skills involved in sample acquisition and processing, deployment and operation of equipment and instrumentation

[74] http://www.smartseaschool.com/

and data acquisition, processing and analysis of these data. Other elements essential in carrying out research surveys at sea will be examined, including safety at sea, survey design and planning, post-survey analysis and assessment, vessel activities and capabilities, and vessel familiarisation and orientation.

2. Training Through Research Surveys (TTRS)

TTRS provides exciting opportunities for graduate and postgraduate students and researchers of marine science and technologies researchers to gain seagoing experience on a range of research cruises on-board the RV Celtic Explorer. This programme is designed to provide mentored training for emerging marine scientists on surveys taking place off the western seaboard of Ireland and ranging as far as Newfoundland.

3. Science@Sea - CPD (Continuing Professional Development) Courses

Science@Sea multidisciplinary courses in marine science offshore operations are intensive two-day courses on-board the RV Celtic Voyager and are aimed at undergraduate and postgraduate students of marine-related sciences, technology and engineering, as well as researchers, technical staff and industry professionals. Special emphasis is placed on the cross-disciplinary skills involved in sample collection and processing, deployment and operation of equipment and instrumentation, and data acquisition and interpretation.

2.6 Summary

The Irish Seafood and Bio-Products sector had, in 2010, an estimated annual sales value of €745 million with a potential to increase revenue to €1 billion by 2020. This opportunity if realised will increase employment from 5,359 in 2014 to 6,782 full-time equivalent jobs by 2020, an expansion of 1,423. The expansion is driven by increased production in the aquaculture sector, with a knock-on effect on jobs in seafood processing (due to increased supply of raw materials).

The replacement demand is estimated to be 2,094 over the period 2015-2020 with the gross demand at 3,517.

Owing to uncertainty within the aquaculture industry arising from the licensing difficulties that have existed in the past the anticipated growth in aquaculture is unlikely to meet the target by 2020. This alternative scenario, the no-growth scenario, would have no expansion demand but would, however, have a replacement demand of 2,084.

There is no expected change in the educational attainment required for operatives, but for administrators, associate professionals and managers NFQ levels are expected to increase. Managers will need business skills and commercial acumen to expand companies, particularly in export markets such as Asia and the US.

Currently, the majority of companies do not find skills or qualifications difficult to source. However, operatives can be difficult to obtain but this is likely to be a retention issue.

In aquaculture, there are increased demands for energy and environmental monitoring, linked to new EU regulations which results in a need for up skilling of professionals in these areas.

Chapter 3: Maritime Transport, Shipbuilding and Services (MTSS)

Sub-sectors
▪ **Shipping and Maritime Transport**
▪ **Marine Retail Services**
▪ **Marine Manufacturing, Construction and Engineering**
▪ **Marine Commerce and Ship Leasing**

3.1 Economic Profile

The Maritime Transport, Shipbuilding and Services (MTSS) sector contains a variety of industries. The 2010 economic indicators for the sector are summarised in Table 3.1:

Table 3.1: 2010 Economic Indicators for the MTSS sector

Sub-sector	Employment (FTE)	GVA (€millions)	Turnover (€millions)
Shipping and maritime transport	4,633	422	1,422
Marine Retail Services	252	34	58
Marine Manufacturing, Construction and Engineering	726	44	111
Marine Commerce	78	40	67
Total	**5,689**	**540**	**1,658**

Source: SEMRU, Ocean Economy Report 2013 (Ref. year 2010)

Table 3.1 shows that GVA for the Maritime Transport, Shipbuilding and Services (MTSS) sector in 2010 was €540 million while turnover was €1,658 million and direct employment was 5,689 FTE. Turnover for shipping and maritime transport decreased between 2007 and 2010 by 35.2%, with a 41.9% decrease in exports in the same period.

The most recent official data is the 2010 data provided by SEMRU (Socio-Economic Marine Research Unit in NUIG). The first Ocean Economy Report, published in 2010, was based on the reference year 2007, at the height of the economic boom (2003 – 2007). The latest report, with a reference year of 2010 and published in December 2013, represents the lowest point of the economic contraction (2007 – 2010) and a significant decrease in activity. In order to develop forecasts of the future skills demand to 2020, baseline estimates for 2014 were produced[75], using additional sources of information, such as: annual CSO (Central Statistics Office) employment trend data for broad sectors; Economic and Social Research Institute (ESRI) Medium Term Review (MTR) 2013 – 2020 and SOLAS Occupational Employment Projection 2020 (Jan 2014); results from company surveys; and discussions with stakeholders.

[75] The 2014 employment estimates were based on the SEMRU 2010 data which was the latest available data at the time. SEMRU are currently updating the 2010 data and will publish the 2012 figures later in 2015. The SEMRU publication will also present 2014 estimates but based on 2012 data.

Projecting forward the 2010 levels of employment to a baseline figure for 2014 for this large and diverse subsector was challenging. All subsectors saw a fall in employment between 2007 and 2010 which may have continued beyond 2010, but evidence from company surveys and stakeholder discussions suggest that the most recent employment trajectory was positive. As a result, the consensus view was that for the sector as a whole the best estimate for 2014 employment was likely to be equal to the 2010 level.

Table 3.2: MTSS profile: FTE Direct Employment 2007, 2010, 2014 (estimated)

Sub-sector	2007‡	2010‡	2014*
Shipping and maritime transport	5,903	4,633	4,633
Marine Retail Services	287	252	252
Marine Manufacturing, Construction and Engineering	1,600	726	726
Marine Commerce and Ship Leasing	105	78	78
Total	**7,895**	**5,689**	**5,689**

‡: SEMRU Data from "*Ireland's Ocean Economy*", Ref Year 2007, (2010) and Ref year 2010 (2013)
*: 2014 baseline estimates, developed by PACEC, based on the 2010 SEMRU data

Shipping and maritime transport directly employed 4,633 FTE in 2010 and employment decreased by 21.5% between 2007 and 2010. The majority of shipping and maritime services activity occurs around the nine State commercial ports: Tier 1 – Dublin, Cork, Shannon-Foynes; Tier 2 – Waterford, Rosslare[76] [77]; Regional –Drogheda, Dun-Laoghaire, Galway, New Ross and Wicklow.

3.1.2 Marine Retail Services

Marine Retail Services are comprised of small and medium sized enterprises involved in retail activities including boat sales, chandlery, and the retail of seafood in fishmonger shops. In 2010, turnover from these marine retail services was €58 million, a decrease of 41.4% since 2007. Marine retail services contributed €34 million in GVA to the Irish economy in 2010 with turnover valued at €58 million in 2010 and exports valued at €4.9 million. The sector directly employed a total of 252 FTE in 2010, a decrease of 12.2% since 2007[78]. In general, the marine retail sector is facing similar challenges to the overall retail sector in Ireland. These challenges relate to a weak domestic demand with consumer spending decreasing every year since 2008. As a result, sales have fallen sharply and the retail sector has experienced significant job losses[79]. With regard to the domestic seafood retail sector, the sector outlook was positive in 2012 with an increase in spending on fish by 5% compared to the previous year[80]; this is expected to increase further.

[76] National Ports Policy, – Iarnrod Eireann operates Rosslare Europort under a complex ownership involving Fishguard port that dates to the 19th Century http://www.dttas.ie/sites/default/files/node/add/content-publication/National%20Ports%20Policy%202013.PDF

[77] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013

[78] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013

[79] IBEC, Retail Ireland Facts, 2013

[80] BordBia Press Release 2013, 'Irish consumers spending 5% more on fish'

3.1.3 Marine Manufacturing, Construction and Engineering

In 2010 marine manufacturing, construction and engineering had a turnover of approximately €111 million with exports amounting to €9.7 million. The sector generated €44 million in GVA to the Irish economy and directly employed 726 FTE. There has been a significant decline in activity between 2007 and 2010 in this sector, with a decrease of 58% in turnover. The decline in this sector was primarily due to the slowdown in the construction industry from 2008 onwards[81].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).

3.1.4 Marine Commerce and Ship Leasing

Marine commerce in this study refers to ship surveying and the legal, finance and insurance services to the shipping industry. In 2010, Marine commerce had a turnover of €67 million and generated €40 million in GVA to the Irish economy. Turnover decreased by 34.2% between 2007 and 2010, particularly in the areas of financing and insurance. The Irish marine commerce sector employed 78 direct FTE in 2010. 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[82]. International ship leasing and charter operations are one of the fastest growing segments of the maritime services cluster. Growth in this segment has been driven by both indigenous and foreign inward investment and Harnessing Our Ocean's Wealth (HOOW)[83] sets out a target for an increase in turnover to €2.6 billion[84] in maritime commerce and ship leasing by 2020. While this is an ambitious target, on-going work by the IMDO and the IDA regarding the proposed International Shipping Services Centre (ISSC) in Dublin could deliver a significant aspect of this growth. It is expected that such a hub would attract firms involved in shipping, ship leasing, shipping finance and operations management[85].

Recent policy developments at the national and European level that are of relevance for the shipping and maritime transport sector in Ireland are the National Ports Policy (2013)[86] and the European Atlantic Action Plan (2013)[87]. Companies operating in the ports and maritime transport services area are largely dependent on the wider performance of the Irish economy to drive growth and investment. The growth in this segment can be linked to future domestic GDP forecasts. The most recent publication of the IMTE[88] (May 2014) indicates that "a number of important indicators show that shipping and port volumes are increasing, and there is investment taking place in an industry sector that has often been a reliable bellwether for economic growth. Preliminary figures

[81] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013
[82] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013
[83] Government of Ireland, Inter-Departmental Marine Coordination Group (MCG), ''Harnessing Our Ocean Wealth - An Integrated Marine Plan (IMP) for Ireland," July 2012
[84] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013The ship leasing component of this target is included in shipping and maritime transport in this report, and cannot be disaggregated due to data confidentiality
[85] Irish Times 2nd August 2013: Global shipping hub plan for Dublin docklands on scale of IFSC has O'Brien as investor - Proposal aims to make Dublin a world centre for shipping and related services
[86] Department of Transport, Tourism and Sport (2013) National Ports Policy http://www.dttas.ie/sites/default/files/node/add/content-publication/National%20Ports%20Policy%202013.PDF
[87] http://ec.europa.eu/maritimeaffairs/policy/sea_basins/atlantic_ocean/index_en.htm
[88] The Irish Maritime Transport Economist. IMDO. 2014. http://viewer.zmags.com/publication/279790e8#/279790e8/1

for the first quarter of 2014 suggest that the trends in the maritime transport sector that were observed in 2013 have continued and that a degree of cautious optimism is justified." In particular, The Irish Maritime Development Office released a statement in June 2013, indicating that the tonnage tax has made a positive economic contribution to Ireland with the creation of new jobs and investment opportunities for over 600 people[89].

3.2 Company Interviews

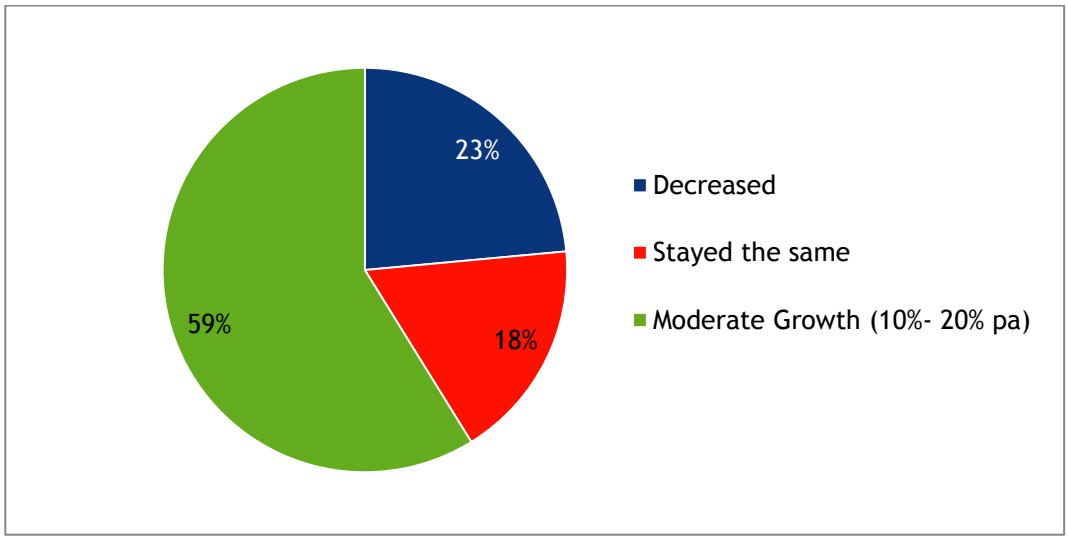
This section details the findings from the 17 companies interviewed from the Maritime Transport, Shipbuilding and Services sector (MTSS). There was a total of 531 employees within the companies interviewed representing approximately 9% of the total employment of 5,689 FTEs in the MTSS sector in Ireland.

It is important to note that all the statistics in this section refer only to the companies interviewed and should not be extrapolated to the entire sector.

3.2.1 Turnover and Exports

Figure 3.1 shows that of the 17 companies interviewed in the Maritime Transport, Shipbuilding and Services sector, ten companies (59%) stated turnover had grown moderately, approx. 10%-20% pa over the last three years while four (23%) stated that turnover had decreased over the last three years.

Figure 3.1: Percentage of Companies that experienced a Change in Turnover over the last 3 Years in the MTSS sector



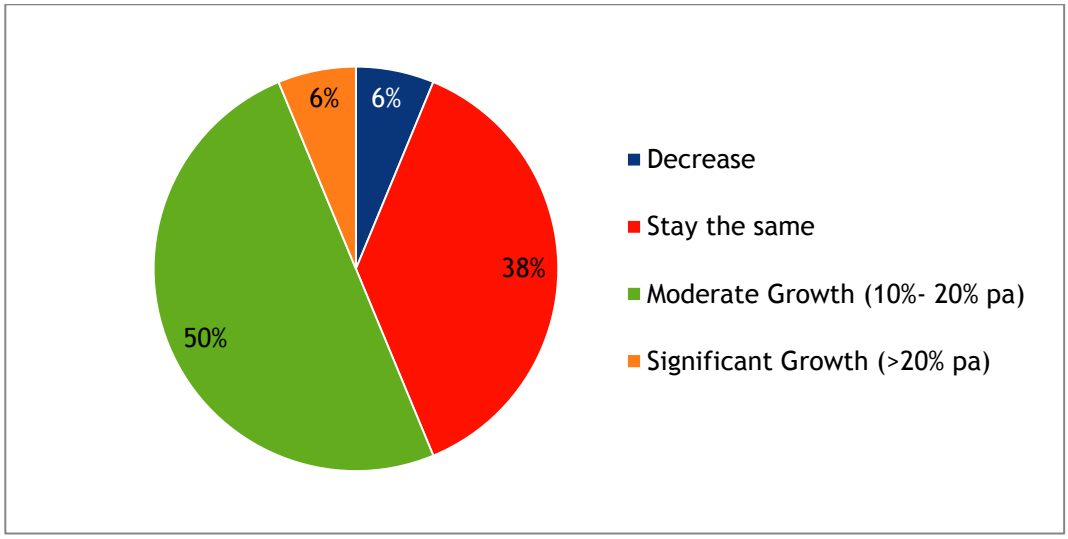
Source: Company interviews – RSM McClure Watters, 2014

Figure 3.2 shows the levels of export growth anticipated over the next six years by the companies interviewed. Eight companies (50%) expected levels of export to grow moderately, (10%-20% pa), while six companies (38%) expected levels of export to stay the same over the next six years.

[89] IMDO Press Release, June 2013: 'Irish based International Shipping & Leasing sector remains steady in 2012'

The interviews with the companies also found that on average, over the last three years approximately 43% of the turnover was from exports.

Figure 3.2: Anticipated Export Growth over the next 6 Years for the MTSS sector



Source: Company interviews – RSM McClure Watters, 2014

3.2.2 Employment Growth/Decline by Occupation

Companies were asked about their employment growth by occupation over the last three years and their anticipated growth for the next six years. Examples of job roles by occupation within the Maritime Transport, Shipbuilding and Services Sector are outlined in Table 3.3.

Table 3.3: Job Roles by occupational level in the MTSS sector

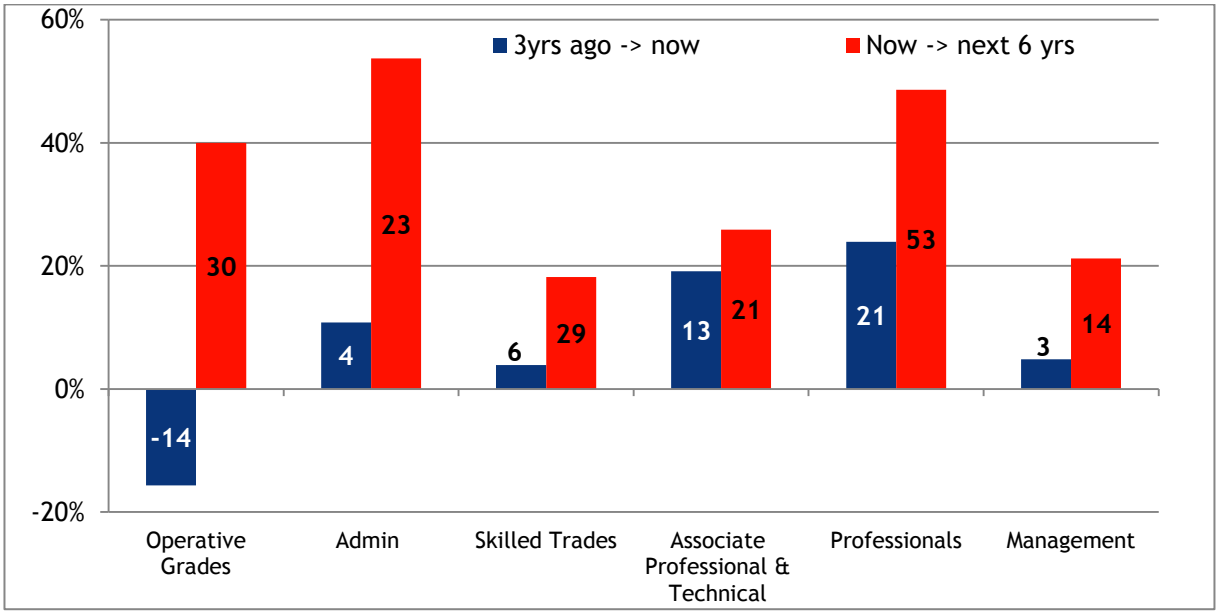
Occupation Level	Job roles
Operative Grades	General Operatives, Stevedores, Tug Operators, Crane operators, Deckhands, Boat Crew, Riggers
Administration	HR staff, General Administrators, Receptionists
Skilled Trades	Harbour Masters, Berthing Masters, Bunker Brokers, Pilots, Radio Operators
Associate Professional & Technical	Marine Insurance Agents, Marine Underwriters, Cargo Claims Personnel, Ships Agents ,Freight Forwarders, Commodity Traders, Charterers, Ship Brokers, Ship Chandlers and Equipment Suppliers
Professionals	Master Mariners and other Deck Officers, Engineering Officers, Naval Architects, Marine Surveyors, Hull Surveyors, Cargo Surveyors, Maritime Analysts, Shipping Accountants & Lawyers, Hydrographic Surveyors, Marine Planners
Management	Directors, Project Managers, Fleet Managers

Source: Our Ocean Wealth – Background Briefing Document, Part III, Enablers - Getting the Conditions Right for Growth (2012)

Figure 3.3 shows that over the last three years there was a decline in employment by 16% (14 persons) for operative grades but for professional occupations employment increased by 24% (21 persons). However over the next six years, companies anticipate the largest employment growth will be for administration occupations at 54% (23 persons) closely followed by the professional occupations at 49% (53 persons) and operatives at 40% (30 persons).

The decline in employment for operative grades with an increase in employment for professionals could be explained by the mix of sub sectors in Maritime Transport, Shipbuilding and Services sector. Ports activity, in line with the economy, has decreased and therefore the number of operatives required would also be expected to decrease. Shipping companies, like those being attracted for the ISSC, employ highly qualified professionals and the IMDO have been working to attract companies here ahead of the ISSC, an example of which is D'amico.

Figure 3.3: Employment Growth within the offshore MTSS sector*



Source: Company interviews – RSM McClure Watters, 2014

*Values are calculated as a percentage of growth from 3 years ago to now and now to the next 6 years, for specific occupations. The numbers stated in the above figure represent the number of employees companies have stated they have gained from 3 years ago to now and will need from now to the next 6 years.

3.2.3 Current and Required Skills Levels

Companies interviewed were asked about the current and future qualifications under the National Framework of Qualifications (NFQ) that they would require for the different occupations, (Table 3.4). The NFQ is detailed in Appendix 4.

While the number of employees within each category is, in some cases, very small and therefore the results may not be representative of the sector an interesting change is emerging which is seen across all the sectors of the marine economy, namely the increase in qualifications for Managers and Administrators. The companies interviewed anticipate the continued requirement of qualifications at NFQ Levels 8 – 10 for its Professionals.

The cells shaded green in Table 3.4 are those for which an increase in NFQ level is anticipated.

Four fifths of those occupied as operatives have a highest level of qualification of NFQ Level 4 -5, however, there is an anticipated but small reduction in this of 6% with a corresponding anticipated required increase in qualification up to Level 6 and 7.

For Administration staff and Managers there is also an anticipated increase in qualification which implies an increase in the professionalisation of the sector with the focus on the development of the managers and administrators to lead, manage and expand the sector.

No significant change is anticipated for professionals or associate professionals as the qualifications required are already in line with what would be expected.

Table 3.4: Current and anticipated NFQ Levels required by Occupation in the MTSS sector

Occupation	NFQ Level											
	Number		<4		4-5		6-7		8		9-10	
	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future
Operative Grades	75	105	0%	2%	81%	75%	**19%**	**25%**	0%	0%	0%	0%
Administration	41	64	2%	2%	32%	14%	37%	34%	**29%**	**48%**	0%	2%
Skilled Trades	159	188	0%	0%	**43%**	**40%**	**57%**	**60%**	0%	0%	0%	0%
Associate Professional and Technical	81	102	0%	0%	18%	16%	60%	54%	20%	27%	2%	3%
Professionals	109	162	0%	0%	0%	0%	1%	1%	**78%**	**81%**	**21%**	**18%**
Management	66	80	0%	0%	24%	14%	44%	40%	**24%**	**40%**	8%	6%
Total	**531**	**701**										

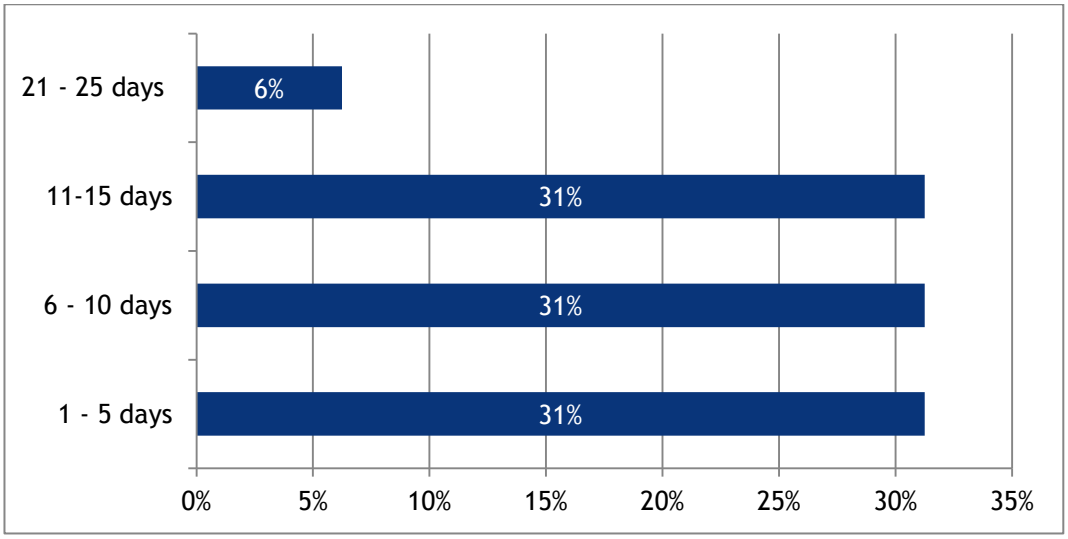
Source: Company interviews – RSM McClure Watters, 2014

Cells shaded indicate no significant change in NFQ level for the occupation, while cells shaded indicate a higher NFQ level required and cells shaded indicate a corresponding decline in NFQ required

3.2.4 Training and Development

The companies were also asked about training provision for their employees. Figure 3.4 shows that for the MTSS 31% of companies stated they had either 1-5, 6-10 and 11-15 training days throughout the year.

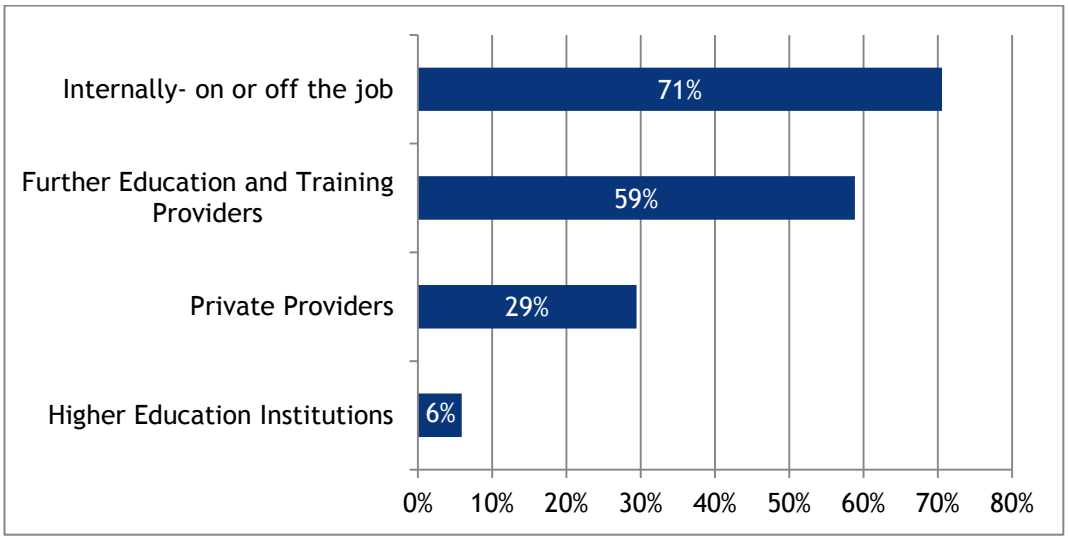
Figure 3.4: Number of Training Days in the MTSS sector



Source: Company interviews – RSM McClure Watters, 2014

Figure 3.5 shows that 71% of companies interviewed used in-house training and 59% used Further Education and Training providers such as the ETBs. The higher education provider which emerged for vessel training and marine engineering was the National Maritime College of Ireland (NMCI).

Figure 3.5: How Training was delivered for the MTSS sector



Source: Company interviews – RSM McClure Watters, 2014

3.2.5 Availability of Personnel

Companies were asked about the availability of personnel with the relevant education, skills and expertise. A summary of the results is outlined in Table 3.5. Caution must be used in interpreting these results given the low response rate.

Table 3.5: Availability of Personnel for the MTSS sector

	Not enough people in my local area with right level of:					
	Education		Experience		Skills	
	N	%	N	%	N	%
Operative Grades	1	6%	1	6%	1	6%
Administration	1	6%	2	12%	1	6%
Skilled Trades	3	18%	3	18%	4	24%
Associate Professionals and Technical	5	29%	7	41%	8	47%
Professionals	3	18%	5	29%	6	35%
Management	0	0%	2	12%	1	
Base= 15 responses						

Source: Company interviews – RSM McClure Watters, 2014

Table 3.5, indicates that companies have the most difficulty finding professionals and associate professionals (pink shaded cells). Companies cited that a lack of basic marine knowledge and field skills was an issue; in particular they stated that Hydrographic Surveyors and Geologists with field skills were lacking.

3.2.6 Difficulties Filling Current Vacancies and Skills Supply

Of 17 companies interviewed 82% had roles which they found were difficult to recruit into. The main roles which were difficult to recruit into were:

- Ship captains;
- Ship engineers;
- Crewmen;
- Hydrographic Surveyors;
- Marine electricians;
- Environmental scientists;
- Marine Planners;
- Vessel masters;
- Welders; and
- Marine engineers.

Companies also noted they found it difficult to find people with planning and geologist qualifications, mechanical and electrical skills, foreign language skills and marine IT skills.

3.3 Stakeholder Consultation and Analysis

The main employment in this area of the ocean economy currently centres on the Irish ports, of which three have been categorised in the National Ports Policy as "Ports of National Significance (Tier 1)" namely: Dublin Port Company, Port of Cork Company and Shannon Foynes Port Company[90]. Each port is individually responsible for 15% to 20% of overall tonnage through Irish Ports. There is clear potential for the development of major port based activities, such as the proposed Liquefied Natural Gas receiving terminal "Shannon LNG" on the Shannon Estuary that would create hundreds of jobs during construction and sustained employment in the plant and in the associated port activities during plant operation over the longer term. The ports' companies themselves have relatively small numbers employed, with around 300 FTE employees between the three Tier 1 ports. Even though vacancies do not come up regularly, specialist skills can be difficult to find, for roles such as harbourmaster and berthing master. These positions are often filled by former merchant seafarers or naval officers. Most of the employment in the ports is in business services providing logistics, haulage, tug boats, stevedoring etc. The majority of the occupations are at "operative" level but as port activities grow, there could be skills issues due to lack of 'maritime' training and experience of operatives.

The consultations highlighted a lack of awareness among school leavers of options for "maritime" careers – a merchant marine career at operator level starting as deck hand and working upwards can provide a well-paid career. Crew and deck operators are available in the global market place, so pay scales can be at the low end but niche areas with offshore skills-sets have good opportunities for higher pay. Evidence from the company interviews indicated that a lack of basic marine knowledge and field skills was an issue when companies go to the market to recruit.

The other skills issues related to ports are linked to the higher labour intensity of the ferries e.g. at the Rosslare Europort, (one of the two ports categorised as "a Tier 2 Port of National Significance") and plans for the development of Cruise tourism infrastructure e.g. Dun Laoghaire (categorised as one of the Ports of Regional Significance).

Other links between the ports sector and other sectors of the ocean economy include the involvement of the Port of Cork in partnership with companies developing technology for the Maritime Monitoring, Security and Surveillance sector. These high-tech marine companies have potential for fast growth trajectories and MTSS is one of the emerging markets identified for focus in Harnessing Our Ocean Wealth. Marine manufacturing is currently a relatively small area of employment, though initiatives highlighted by the Development Task Force on ship building in Cork Harbour and a centre for international yacht racing teams would create much higher levels of employment in the longer term. These examples illustrate the role ports play as an enabling infrastructure throughout the ocean economy.

On-going work by the Irish Maritime Development Office (IMDO) and the IDA regarding the proposed international shipping services centre (ISSC) is a major project likely to impact on employment in the maritime transport area. There are currently 17 companies (technically 9 groups, operating 42 subsidiaries and 8 separate individual companies) in Ireland that own or manage around 182 vessels, which operate between ports worldwide but do not necessarily dock in Ireland. The Irish offices employ engineers, ex-captains and specialists in ship broking/chartering, marine law and finance, crew management, logistics and freight. The proposed ISSC involves the development of a purpose

[90] http://www.dttas.ie/sites/default/files/node/add/content-publication/National%20Ports%20Policy%202013.PDF

built centre in Dublin, similar to the International Financial Services Centre (IFSC) and a phased build-up to accommodate over 100 maritime companies and creating over 3,500 jobs. These maritime companies will need skills where business experience is combined with maritime knowledge e.g. maritime, leasing and brokering skills. One approach to addressing this is where ex-mariners are recruited and the training focus is on business skills, while other companies could choose to "marinise" the business based skills. D'amico is an example of one such company that has established an Irish office and currently employs around 30 people.

Shipping services provide opportunities to work abroad and the establishment of the ISSC would offer scope to return to well-paid employment in Ireland. The workforce is mobile and tends to move between companies to broaden experience for promotion and the cluster to be created by the proposed ISSC is an attractive proposition for international companies. Courses on Nautical Sciences, for example at the NMCI, help to provide the skills needed by the shipping services companies and specialist modules or masters for economics, finance, and engineering graduates that cover specialist shipping application areas could address the growing need for these skills that would result from a successful ISSC.

3.4 Future demand for MTSS Skills, 2015-2020

3.4.1 Introduction

This section of the report deals with the potential future demand for skills employment in the Maritime Transport, Shipbuilding and Services subsector over the period 2015-2020 arising from expansion of the sector and replacement of employees who retire referred to as expansion and replacement demand respectively.

Scenario 1 assumes that the turnover target of €2.6bn as set out in HOOW will be met by 2020 and the impact that this would have on employment and skills demand is forecast. Consultations with industry stakeholders, informed by the economic background data gathered, were used to determine how this increase in turnover could be achieved, how the additional turnover would be distributed between the various industries making up the Maritime Transport, Shipbuilding and Services sector and how employment would need to increase in order to generate this turnover. A modelling exercise was then conducted using the information from the company interviews to estimate how the expansion demand would be distributed by occupational grade in each sub-sector over the period 2015-2020.

3.4.2 Scenario 1: Achieving the HOOW targets

3.4.2.1 Scenario 1 Summary

A forecast of employment was developed, in consultation with stakeholders and shaped by the available economic data and published forecasts and which assumes that the HOOW target of €2.6 billion turnover for the Maritime Transport, Shipbuilding and Services sector would be met by 2020. There are two main components to growth in the Maritime Transport, Shipbuilding and Services sector which need to be treated separately for the purposes of this study:

i. growth in the shipping and maritime transport (excluding ship leasing) subsector, driven by investment in ports and which currently forms the bulk of the sector in employment terms; and

ii. the establishment of an International Shipping Services Centre (ISSC) in Dublin, a world class, industry-specific office facility in Dublin's Docklands to accommodate blue chip global shipping and trading companies.

The premise of Scenario 1 is that most of the expansion would take place from the establishment of the ISSC.

3.4.2.2 Contribution from Maritime Commerce and Ship Leasing: Scenario 1

If developed, the ISSC would account for the majority of the €2.6bn turnover target from HOOW. The Irish Maritime Development Office (IMDO) have produced a Skills, Training and Educational Needs assessment for the ISSC and anticipate that 3,500 jobs could be hosted at the site across a range of up to 100 companies[91]. (Table 3.6)

Table 3.6: Anticipated breakdown of jobs in the International Shipping Services Centre

Organisation Type	% of jobs	No. of jobs
International shipping companies	70	2,450
National shipping companies	9	315
International banks	5	175
Insurance and finance companies	4	140
National and international traders	3	105
Brokers and agents	6	210
Others	3	105
Total	100	3,500

Source: IMDO: Skills, Training and Educational Needs

As can be seen from the Table 3.6, international shipping companies are expected to account for 70% of the jobs created by the ISSC. It is envisaged that senior roles (representing 10-20% of the total employed) within the international shipping companies will be filled by candidates with either operational experience in shipping or those with experience in commercial, financial and taxation issues. It is expected that experienced mariners (captains and chief engineers) will be recruited to fill senior operational roles and accountants/ business graduates will fill commercial and financial roles. Less senior roles (representing 20-25% of the total employed) will be filled by candidates with primary degrees in business subjects or professional qualifications from bodies such as the Chartered Institute of Logistics and Transport, or have qualified as Chartered Ship Brokers.

The jobs created by the other 30% of organisations are expected to be filled primarily by business graduates in the areas of banking, finance, insurance, and in the expanded activities of national shipping companies.

[91] Skills, Training and Education Needs, International Shipping Services Centre, Dublin Docklands. IMDO. 2014.

3.4.2.3 Assumptions for Other Sectors: Scenario 1

Port activity (and associated jobs) is expected to grow at a rate of 3-5 % per annum:

- All the Tier 1 ports have extensive plans to develop capacity in the short, medium and long term and all have well developed Master plans and/or Strategic Plans in place - supported by National Ports Policy.
- Shannon Foynes Port Company (SFPC) and the Port of Cork have significant sheltered deep water sites available for future economic development. This is a strategic advantage owing to the trend for larger vessels requiring deeper waters and a small number of ports globally with sufficient depth.
- The development of deep-water sites is also an advantage for other major facilities such as: energy storage, large scale processing, manufacturing and assembly of offshore turbines and transhipment facilities. Examples of existing and potential developments include:-
  - the proposed Shannon LNG (Liquid Natural Gas) Terminal which will employ 100 FTEs;
  - Rusal's Alumina plant which directly employs over 450 FTE's and 400 contract FTEs with a cumulative capital expenditure of well over €1bn invested in the plant in Askeaton, Co. Limerick.

3.4.3 Employment and Skills Implications

The scenario forecasts an expansion demand for the sector of 4,928 jobs, with 3,500 coming from Marine Commerce including Ship Leasing, 1,400 from shipping and maritime transport and the remaining 28 from the other industries in the Maritime Transport, Shipbuilding and Services sector.

The distribution of the additional 4,928 FTE jobs by occupation level is shown in Table 3.7. The first column shows the 2014 FTE baseline estimate by occupation level. The next set of columns presents the expansion demand, the percentage of that figure to the 2014 baseline estimate for that occupation level and the percentage of the occupation expansion to the total expansion demand. Then follows the replacement demand - those leaving, e.g. due to retirement or change of occupation. The gross demand is the sum of the expansion and replacement and is the true reflection of the skills demand for the sector. Summed across the period 2015-2020, the total number of workers leaving is estimated to be 2,373, known as the replacement demand, which when summed with the expansion demand of 4,928 gives a total gross demand of 7,301 employees.

Table 3.7: Distribution of Expansion and Replacement Demand for the MTSS sector by occupation level

Occupation Level	2014 Baseline Estimate	% 2014 Total Baseline	Expansion Demand 2014-2020		% of Expansion demand	Replacement Demand 2014-2020		% of Replacement demand	Gross Demand		% of Gross demand
			No.	% of 2014		No.	% of 2014		No.	% of 2014	
Operatives	814	14%	850	104%	17%	476	58%	20%	1,326	163%	18%
Administrative	445	8%	651	146%	13%	283	64%	12%	934	210%	13%
Skilled Trades	1,727	30%	821	48%	17%	706	41%	30%	1,527	88%	21%
Associate Professionals & Technical	803	14%	793	99%	16%	261	33%	11%	1,054	131%	14%
Professionals	1,183	21%	1,416	120%	29%	452	38%	19%	1,868	158%	26%
Managers	717	13%	397	55%	8%	195	27%	8%	592	83%	8%
Total	**5,689**		**4,928**	**87%**		**2,373**	**42%**		**7,301**	**128%**	

Source: PACEC, 2014

The distribution of expansion demand (4,928 FTE jobs) by NFQ level is shown in Table 3.8 The demand is concentrated in levels 6 – 7 and 8 of the framework (higher certificate/advanced certificate and honours degree or equivalent). This is largely driven by a substantial increase in the number of workers in professional and associate professional occupations (2,209 of 4,928) arising from the skills requirements of the International Shipping Services Centre.

Table 3.8: Distribution of Expansion demand by Educational Attainment at NFQ level for the MTSS sector

NFQ Level		Expansion Demand
4 - 5	Secondary School Leaving Certificate and Certificate FET awards	542
6 - 7	Higher Certificate/Advanced Certificate and Ordinary Bachelors Degree	1,555
8	Honours Degree or Higher Diploma	2,591
9 - 10	Masters and Doctoral Degrees / Postgraduate diploma	240
Net Total		**4,928**

Source: Company interviews – RSM McClure Watters, 2014

3.5 Supply Side Information

3.5.1 Maritime Transport

The National Maritime College of Ireland (NMCI), a purpose built facility in Ringaskiddy about 18km from Cork city, is the national centre for education and training for careers in the maritime sector. It is a constituent college of Cork Institute of Technology (CIT) and comprises of the Irish Naval Service (INS) and the School of Nautical Studies. NMCI offers degree courses in Nautical Science, Marine and Plant Engineering and a Certificate in Seamanship.

The Irish Naval Service (INS), which is the maritime component of the Defence Forces, has two entry levels for joining the Naval Service i.e. as a Cadet or as a Recruit. The NMCI provides the non-military training for the INS.

While the focus of this study is on skills for enterprises in the Marine economy, the Naval Service training is included here for completeness as the skills can be transferred over to the merchant marine sector (Table 3.9). It is therefore a potential skills resource should a person decide to leave the defence forces.

Table 3.9: List of NMCI Maritime Training Courses

Course	Institution	Award	Duration
Merchant Shipping - Sea Based Roles			
Higher Certificate in Nautical Studies	NMCI	Certificate	3 yrs
Nautical Science	NMCI	BSc	3.5 yrs
Marine and Plan Engineering	NMCI	BEng	4 yrs
Marine Electro-technology	NMCI	BEng	4 yrs
Irish Naval Service			
Cadet Training - Operations	Irish Naval Service in NMCI		
Cadet Training - Engineering	Irish Naval Service in NMCI		
Engineering Training - Tradesmen: Fitters, Electricians and Joiners	Irish Naval Service in NMCI		
Communications Training - Comms Operators or Radio Radar Technicians	Irish Naval Service in NMCI		

Source: List compiled by EGFSN-DJEI, Nov 2014

The NMCI has a Maritime Engineering Unit including a full size working ship's engine room, fully instrumented control room, welding, electrical and mechanical engineering workshops. It also has marine simulators, full mission bridge simulator, engine room, port work and VTS simulators as well as GMDSS (Global Maritime Distress and Safety System) simulators, liquid cargo handling and damage control. The facility provides training in all areas of Sea Safety, Emergency Response, Fire Fighting and GMDSS Maritime Communication. The college also has a Sea Survival Pool in which extreme

environmental conditions can be simulated as well as fully compliant equipment, instruments and platforms for training purposes. Approximately 100 students graduate each year from NMCI with either the BSc or BEng.

There are no dedicated Maritime Business Masters available in Ireland. The only specifically Maritime business courses available in Ireland are those provided by the Institute of Chartered Shipbrokers (ICS).

The ICS is the only internationally recognised professional body in the maritime arena and it represents shipbrokers, ship managers and agents throughout the world. It is a major provider of education and training and sets and examines the syllabus for membership, providing the shipping industry with highly qualified professionals. An Ireland Branch of the ICS was formed in 1974.

The Professional Qualifying Examination (PQE) forms the pinnacle of the ICS qualification and comprises seven examinations over a maximum of five years. In addition to the PQE, for people with little experience, there is a Foundation Diploma and an Advanced Diploma the latter being designed as a stepping stone into full professional qualification. Both these Diplomas are stand alone.

Table 3.10 lists the required modules for the Diplomas and PQE.

Table 3.10: The Institute of Chartered Shipbrokers Syllabus for its Professional Qualifying Examinations

PQE Compulsory Papers	
Introduction to Shipping	Compulsory for Foundation Diploma
Legal Principles in Shipping Business	
Economics of Sea Transport and International Trade	
Shipping Business	Compulsory in Yr 1 for PQE Compulsory for Advanced Diploma
Optional Papers - Group 2	
Dry Cargo Chartering	One subject from Group 2 for both the Foundation and Advanced Diploma The PQE requires choosing a total of 3 examinations from the combined Group 2 and Group 3.
Ship Operations and Management	
Ship Sale and Purchase	
Tanker Chartering	
Liner Trades	
Port Agency	
Logistics and Multi-modal Transport	
Port and Terminal Management	
Offshore Support Industry	
Optional Papers - Group 3	
Shipping Law	
Marine Insurance	
Shipping Finance	

Source: List compiled by EGFSN-DJEI, Nov 2014

In Ireland on average about 40 people a year take the ICS examinations in contrast to 6,000 globally. Despite this <1% participation rate an Irish student won an international award in 2014 for obtaining the highest marks in the world in one of the modules. The majority (around 95%) of people who undertake ICS training are employed in the shipping sector or the shipping component of a financial/legal/insurance company. Courses can be done via on-line correspondence or at a Dublin venue, one Saturday per month (six hours) between September and April. Two modules are taught each year and the examinations are held in April.

Waterford Institute of Technology (WIT) provides a 1 year add-on, NFQ level 7 ordinary BA, for students who have a Higher Certificate (NFQ Level 6) in either Legal Studies or Business Studies. It is designed for those seeking work in areas related to international trade, namely: export/import administration, marketing and financing, international carriage and insurance of goods. Students who obtain this award receive some exemptions for the ICS – PQE.

The only private provider of training for international trade (excluding Logistics and Supply Chain) that was identified was Export Edge. The Professional Development courses that they provide are listed in Table 3.11. Approximately 200 people attend these courses annually with some attending more than one course. Typically those attending courses are working in the sector and are sent on the course by their employer. Further details on the courses are available on their website[92].

Table 3.11: Professional Development Courses from Export-Edge

Course Title - Award/Awarding Body	Duration
International Trade - QQI and Irish Institute of Credit Management	3 months
International Trade Blended Learning Course QQI and Institute of Leadership and Management (ILM)	
Dangerous Goods by ait - iata approved	3 days
Letters of Credit Operations	1 day
Export Procedures and Documentation	1 day
Customs Clearance Procedures	1 day
Customs Compliance Procedures	2 days
Customs Compliance Refresher	1 day
VIES INTRASTAT and Customs Procedures	1 day
International Payment methods for exports	1 day
International Credit Collections	
Dangerous Goods ADR Awareness	
Dangerous Goods by Sea - Introductory IMDG	
Dangerous Goods by Sea - IMDG Code Advance Course	
Dangerous Goods Safety Adviser - DGSA	

Source: Department of Jobs, Enterprise and Innovation November 2014

[92] www.export-edge.com

Courses dealing with Logistics and Supply Chain Management are not dealt with in this report as they are the subject of a separate EGFSN report looking specifically at Logistics[93].

Another alternative for graduates who wish to pursue a career in Shipping is to go abroad to undertake a Masters designed specifically for the shipping and maritime sector. Some countries have a long established tradition in shipping and undergraduate and postgraduate courses have evolved to provide graduates for the sector. Many of these courses are conducted in English. Table 3.12 lists a number of postgraduate courses available abroad.

Table 3.12: Post-Graduate Qualifications in Shipping available in Major shipping locations

Provider	Course Title
CASS Business School – City University London	MSc in Shipping, Trade and Finance
BI Norwegian School	Executive MBA in Maritime Offshore
Copenhagen Business school	Executive MBA in Shipping & Logistics – The Blue MBA
Nanyang Technical University Singapore	MSc in Maritime studies – Accredited by the BI Norwegian School and the Maritime Port Authority of Singapore
Erasmus Rotterdam	MSc in Maritime Economics and Logistics

Source: The IMDO Ireland

In addition to the formal maritime qualification courses and the short course on trade and exports a series of practical short courses for those working or aiming to work in the shipping/port sector are provided by the NMCI. These are outlined in table 3.13.

Table 3.13: Shipping and Port Sector Training by NMCI

Course Title	Training classification	Duration
Container Gantry Crane Operation – Simulator and Classroom based course, plus 6 months practical crane operation.	Port Sector[94]	3 days
Mobile Dockside Crane Operation - – Simulator and Classroom based course, plus 6 months practical crane operation.	Port Sector	5 days
Container Gantry and Dockside Crane Operator Induction – for candidates who have little or no experience of operating cranes in a port related environment.	Port Sector	2 days
Pilot Refresher Course	Port Sector	2.5 days
Port Pass – Docks Operation and Safety Training	Port Sector	1 day
Shipboard Familiarisation	Specialised Course	
Tanker Familiarisation	Specialised Course	

[93] http://www.skillsireland.ie/publications/featuredpublications/title,12923,en.php

[94] Port Sector Training is provided in association with the Port of Cork

Course Title	Training classification	Duration
Specialised Training for Oil Tankers (STCW-95)	Specialised Course	5 days
Operator Electronic Chart Display - Based on IMO (International Maritime Organisation) Model course	Simulation	5 days
Oil and Shipping Operations	Petrochemical, Oil and Commodities[95]	2 days
Oil Tanker Operations in Port		
Understanding LNG (Liquid Natural Gas)		
LNG Carrier Operations in Port		
LPG (Liquid Petroleum Gas)- Introduction		
LPG Operations in Port		
Bunkering - A complete Guide		3 days
Seismic Replenishment at Sea Operations		1 - 5 days
Ship to Ship (STS) Transfer Commercial Training		1-2 days
Ship to Ship (STS) Transfer Simulator Course		
Dry Cargo Operations and Chartering		2 days
Rummage Training		
Deep Rummage Training		
Actions to be taken to Prevent acts of Piracy and Armed Robbery		

Source: List compiled by EGFSN-DJEI, Nov 2014

3.5.2 Maritime Safety

While Maritime Safety is included in this section, Maritime Transport, Shipbuilding and Services, safety applies to all sea-going vessels therefore these maritime safety courses apply right across all aspects of the Marine economy where a boat goes out on the sea.

The Maritime Safety Directorate of the Department of Transport, Tourism and Sport comprises two main sections: the Maritime Safety Policy Division (MSPD) and the Marine Survey Office (MSO), with the latter dealing with the examination and certification of seafarers' competencies and the enforcement of standards by way of audits on organisations and facilities and prosecutions for breaches of regulations. Maritime Safety encompasses merchant ships, passenger vessels, fishing trawlers and leisure craft.

Shipping is a truly international industry, and it can only operate effectively if the regulations and standards are themselves agreed, adopted and implemented on an international basis. The International Maritime Organisation (IMO) is the forum at which this process takes place. A

[95] Petrochemical, Oil & Commodities training are provided by GTSS (GAC Training & Service Solutions) a partnership between GAC and the National Maritime College of Ireland established to provide innovative and cost saving training for the maritime sector. GAC is a global provider of integrated shipping, logistics, marine and related services.

specialized agency of the United Nations, the IMO is the global standard-setting authority for the safety, security and environmental performance of international shipping. Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented. The Maritime Safety Directorate implements agreed revised safety standards through the ratification of international treaties/conventions and the introduction of regulations and legislation.

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), developed in 1978 (amended in 1995 and 2012,) was the first to establish basic requirements on training, certification and watchkeeping for seafarers on an international level. Previously such standards were established by individual governments, usually without reference to practices in other countries and as a result standards and procedures varied widely.

While the Standard is still colloquially referred to as the STCW-95 certificates are issued as 'STCW-78 as amended' -the most recent 2012 Manila Amendment brought the standard back to the 1978 version. The Maritime Safety Directorate publishes a list of approved training course providers under STCW -78/95. The most recent list is Marine Notice No. 33 of 2013 (amended 26/06/2014)[96].

The approved STCW-78/95 Certificates of Proficiency Safety Training courses for Sea-going personnel available in Ireland are shown in table 4.14.

Table 3.14: List of STCW Sea Safety Training Courses

Course	Award	Duration
Personal Survival Techniques (PST), STCW-95	STCW-78/95, DTTAS accredited	1 day
Elementary First Aid - (STCW-95)	STCW-78/95, DTTAS accredited	1 day
Personal Safety and Social Responsibility (PSSR), STCW-95	STCW-78/95, DTTAS accredited	1 day
Fire Prevention and Fire Fighting (STCW-95)	STCW-78/95, DTTAS accredited	3 days
Basic Safety Training - includes: PST, PSSR, Elementary First Aid; Fire Prevention and Fire Fighting	STCW-78/95, DTTAS accredited	6 days
Advanced Fire Fighting (STCW-95)	STCW-78/95, DTTAS accredited	5 days
Medical first Aid Aboard Ship (STCW-95)	STCW-78/95, DTTAS accredited	3 days
Medical care training Aboard Ship (STCW-95)	STCW-78/95, DTTAS accredited	5 days
Proficiency in Survival Craft and Rescue Boats - STCW95	STCW-78/95, DTTAS accredited	5 days
Proficiency in Fast Rescue Boats - STCW95	STCW-78/95, DTTAS accredited	2 days
Crisis Management and Human Behaviour - STCW95	STCW-78/95, DTTAS accredited	½ day
Crowd Management - STCW95	STCW-78/95, DTTAS accredited	½ day
Efficient Deck Hand - STCW95	STCW-78/95, DTTAS accredited	5 days
Proficiency in Security Awareness - STCW95	STCW-78/95, DTTAS accredited	1 day

Source: List compiled by EGFSN-DJEI, Nov 2014

[96] http://www.dttas.ie/sites/default/files/corporate/MN33of2013-AmendedApproved%20Training%20Course%20Providers%20UPDATE_1.pdf

The DTTAS approved providers for the above courses are as follows:

- BIM – Donegal and Castletownbere
- NMCI - Cork
- Chris Mee Safety Engineering (CMSE) - Cork
- Sea & Shore Safety Services - Dublin
- Bow Waves - Galway
- SeaTec Maritime Training - Mayo
- West Galway School of Navigation - Galway
- Professional Maritime Training - Donegal
- Cantwell Keogh & Associates - Cork

The providers can only provide training for those sections of the STCW convention for which they have been approved. It has not been possible to ascertain the total number of STCW certificates issued in any given year as this data is no longer collected by the Marine Survey Office.

In addition to the above sea safety courses there are additional STCW courses for Certificates of Competency in GMDSS radio-communications. These are shown in Table 3.15.

Table 3.15: List of STCW GMDSS Radio Communication Training Courses

GMDSS Radio Course	Award	Duration
Restricted Operator Certificate - ROC	STCW-78/95, DTTAS accredited	4 days
General Operator Certificate - GOC	STCW-78/95, DTTAS accredited	10 days

Source: List compiled by EGFSN-DJEI, Nov 2014

The companies approved by the DTTAS to provide these radio courses are as follows:

- BIM
- NMCI
- VHF.ie (Moher Technologies)

In addition to the STCW – GMDSS courses there are VHF (Short and Long range) courses approved by the DTTAS. For anyone operating a boat, with a VHF radio it is a legal requirement for the person using the boat to have the appropriate certificate (Table 3.16)

Table 3.16: List of Radio Courses

GMDSS Radio Course	Award	Duration
Short Range Certificate for VHF Operators (SRC)	DTTAS accredited	2 days
Long Range Certificate for VHF Operators (LRC)	DTTAS accredited	5 days

Source: List compiled by EGFSN-DJEI, Nov 2014

The companies providing VHF – SRC and LRC radio courses are listed below.

- BIM
- NMCI
- VHF.ie (Moher Technologies)
- *West Galway School of Navigation*[97]
- *SeaTec Maritime Training*
- *Sea & Shore Safety Services*
- *Professional Maritime Training*

Cork County ETB also provides a "Seafaring Safety Skills" courses. The next course is scheduled for September 2015. This is a nine week course and includes the STCW-78/95 Basic Safety Training (PST, PSSR, Elementary First Aid, Fire Fighting and Prevention). It also has modules on Coastal Navigation and General Ship Knowledge and Seamanship. This course provides learners with the skills and competency to perform as an effective junior member of the deck team on board a merchant ship trading internationally. The course also aims to provide a learner with qualifications which will enable them to gain access to further formal training in Seamanship leading to a qualification as an Efficient Deckhand (EDH). This course also has a module on Career planning and Job Seeking Skills. Applicants apply through their local Employment/Intreo office.

3.6 Summary

Growth in this sector has been driven by both indigenous and foreign inward investment and Harnessing Our Ocean's Wealth (HOOW) has set out a turnover target of €2.6 by 2020. This is an ambitious target and it is envisaged that the proposed International Shipping and Services Centre (ISSC) in Dublin could facilitate it being reached.

This opportunity if realised will increase employment by 4,928 FTE new jobs by 2020 of which 3,500 jobs, would be at the proposed ISSC. The remainder of the proposed growth would be driven by investment in the ports. The replacement demand is estimated to be 2,373 FTE over the period 2015-2020 with the gross demand at 7,301.

The main skills which were difficult to source are engineers (ship, marine and composite), hydrographic surveyors, and environmental scientists. Companies also found people with adequate practical experience and marine knowledge difficult to source and had difficulty recruiting ships captains; ship engineers and crewmen.

There is development potential for major port based activities which would create sustained employment in the associated port activities over the longer term and not just in the construction phase.

There appears to be lack of awareness among school leavers of the possibilities and options available of a maritime career.

[97] The companies listed in italics are not on the DTTAS approved list, but their websites indicate that they provide some or all of the GMDSS radio courses

Chapter 4: Energy

Sub-sectors
▪ Offshore Oil and Gas Exploration and Production
▪ Offshore Marine Renewables - Wind, Wave and Tidal

4.1 Economic Profile

There are two distinct industries in the energy sector that relate to Irelands Ocean economy, namely the offshore oil and gas sector and the offshore marine renewables sector. The offshore oil and gas sector is a well-established, global industry, though activities in Ireland are at a low level due to few discoveries of commercially attractive offshore oil and gas fields when compared to activities in UK and Norway in the North Sea.

Marine Renewables centres on technologies that generate electricity from offshore wind, wave energy and tidal current resources. It is an emerging sector, which has seen dramatic growth globally over the last 10 years, mostly through the development of large offshore wind turbine arrays in the UK, Denmark and Germany.

Table 4.1 summarises the 2010 economic indicators for the sector. The oil and gas sector, although at a low level in Ireland compared to the UK and Norway, is an established industry which is reflected in the significantly larger turnover than for the newly emerging offshore renewables sector.

Table 4.1: 2010 Economic Indicators for the offshore Energy sector

Sub-sector	Direct Employment (FTE)	GVA (€millions)	Turnover (€millions)
Offshore Oil and Gas Exploration and Production	861	61	126
Marine Renewables – Offshore Wind, Wave and Tidal	216	4	12
Total	**1,077**	**65**	**138**

Source: SEMRU, Ocean Economy Report 2013 (Ref. year 2010)

The table above shows that GVA for the Energy sector in 2010 was €65 million while turnover was €138 million. In addition, direct employment in the Energy sector was 1,077 FTE.

The most recent official data is the 2010 data provided by SEMRU (Socio-Economic Marine Research Unit in NUIG). The first Ocean Economy Report, published in 2010, was based on the reference year 2007, at the height of the economic boom (2003 – 2007). The latest report, with a reference year of 2010 and published in December 2013, represents the lowest point of the economic contraction (2007 – 2010) and a significant decrease in activity. In order to develop forecasts of the future skills demand to 2020, baseline estimates for 2014 were produced[98], using additional sources of

[98] The 2014 employment estimates were based on the SEMRU 2010 data which was the latest available data at the time. SEMRU are currently updating the 2010 data and will publish the 2012 figures later in 2015. The SEMRU publication will also present 2014 estimates but based on 2012 data.

information, such as: annual CSO (Central Statistics Office) employment trend data for broad sectors; Economic and Social Research Institute (ESRI) Medium Term Review (MTR) 2013 – 2020 and SOLAS Occupational Employment Projection 2020 (Jan 2014); results from company surveys; and discussions with stakeholders. Employment and turnover in Marine Renewables grew between 2007 and 2010 and the consensus position, based on the evidence provided and discussions with stakeholders, was that this growth rate would have continued between 2010 and 2014 though at a slightly lower rate. Offshore Oil and Gas also gained in employment between 2007 and 2010, but lost substantial turnover and GVA over the same period, and the stakeholder discussions suggested that further employment growth between 2010 and 2014 would have been unlikely and so the 2010 employment figure has been carried forward to the 2014 baseline.

Table 4.2: Offshore Energy profile – FTE Direct Employment 2007, 2010, 2014 (estimated)

Sub-sector	2007‡	2010‡	2014*
Offshore Oil and Gas	790	861	861
Offshore Renewables	101	216	287
Total	**891**	**1,077**	**1,148**

‡: SEMRU Data from "*Ireland's Ocean Economy*", Ref Year 2007, (2010) and Ref year 2010 (2013)
*: 2014 baseline estimates, developed by PACEC, based on the 2010 SEMRU data

4.1.1 Oil and Gas exploration and production

The 2010 figures show that the Irish Oil and Gas exploration and production industry directly employed 861 people full time, had a turnover of €126 million and added a direct gross value of €61 million to the Irish economy. The sector is concentrated in the coastal regions of Donegal, Mayo, Cork, Kerry, Galway and in the South East. The Irish Offshore Operators Association (IOOA) is the representative body for the Irish offshore oil and gas industry[99]. There are currently sixteen member companies of the IOOA, however, the number of companies who hold options, exploration licences and prospecting licences is much larger[100]. In 2006, it was estimated by the Department of Communications, Energy and Natural Resources - Petroleum Affairs Division (DCENR - PAD) that there were potentially 10 billion barrels of oil equivalent (gas and/or oil) in the Atlantic Margin in the West of Ireland in addition to Kinsale, Ballycotton and Seven Heads. There are financial investment risks associated with development of gas sites which could damage the potential for growth in the sector. A review of Ireland's oil and gas industry[101] stated that based on historical experiences, the probability of making a commercial discovery in Ireland is low (1 in 32) compared with Norway (1 in 7) and the UK (1 in 6).

The Corrib gas field is the only commercial discovery in Ireland in the last 20 years in relation to petroleum potential. The project is operated by Shell E&P Ireland Ltd (with partners Statoil and Vermillion Energy) and over its lifespan the gas field is expected to contribute €3 billion to Ireland's

[99] The IOOA proactively assists in the development of oil and gas exploration and production in Ireland's waters. It provides a forum in which its member companies work together to identify and tackle issues facing Ireland's offshore industry.
[100] http://iooa.ie/about-us/member-companies/
[101] Making the Most of Our Natural Resources. PwC. 2013 http://www.providenceresources.com/uploads/pwcoilandgasreport-final-may2013.pdf

GDP. A study of the Economic Benefits of the Corrib Gas Project (2012)[102] estimated that when the gas field is fully operational it will employ directly approximately 55 full time jobs and give rise to a further 76 indirect jobs over the 15-20 years of its activity.

Ireland's fiscal regime for oil and gas exploration and production has evolved considerably[103] since 1975 when it was first introduced. Between 1987 and 2007 there were a number of changes implemented which were designed to make the oil and gas sector more attractive to exploration companies. In addition, 2007 saw the introduction of Profit Resource Rent Tax (PRRT) that would be payable in the case of more profitable fields. This ensured the State's interest in a large commercial discovery was protected. A major driver for the offshore oil and gas industry in Ireland in the near future will be the Atlantic Margin Licensing Round[104] which has been launched for 2015. This has the potential to provide industries with the certainty necessary to invest in offshore exploration in Irish waters, and has the potential to employ large numbers of people in Ireland if viable discoveries are made.

4.1.2 Marine Renewable Energy – Off-shore Wind, Wave and Tidal

The wave and tidal sectors are still in the developmental stages in Ireland and globally, while the offshore wind sector is seeing considerable progress taking place at a European and global level[105].

In Ireland in 2010, the Offshore Renewables sector had a turnover of €12 million. Turnover increased by 100% between 2007 and 2010. There were 216 direct FTE in the field of Offshore Renewables in 2010. Employment more than doubled between 2007 and 2010 in this sector[106]. At present there are 5 companies actively involved in developing offshore wind energy projects in Ireland; these are: SSE Renewables, Oriel Windfarm, Codling Wind Park, Dublin Array and Fuinneamh Sceirde Teoranta[107]. The only offshore wind farm constructed to date is the first phase of the Arklow Bank project.

The EU Blue Growth[108] study identified offshore wind and ocean renewable energy as two of the most promising activities with regards to future growth activities. 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. WestWave[109] is a collaborative initiative led by ESB which will generate an initial 5MW of electricity from wave energy, this is in line with ESB's strategy and will fulfil phase 3 of the Irish Government's Ocean Energy Strategy.

[102] Economic Benefits of the Corrib Gas Project. Goodbody Economic Consultants. 2012. http://www.corribgaspipeline.com/uploads/file/further-information/goodbody_report%20November%202007.pdf
[103] Review of Irelands Oil and Gas Fiscal System. Wood Mackenzie. 2014 http://www.dcenr.gov.ie/NR/rdonlyres/639CBB44-41D6-49F1-9629-7E1A98BBBDCC/0/ReviewofIrelandsOilGasFiscalSystem.pdf
[104] http://www.dcenr.gov.ie/NR/rdonlyres/9B40A9A2-10AE-4E6A-9382-1D07FC76A802/0/2015LicensingRoundNotice18June2014Final.pdf
[105] Offshore Renewable Energy Development Plan: A Framework for the Sustainable Development of Ireland's Offshore Renewable Energy Resource. Feb 2014. http://www.dcenr.gov.ie/Energy/Sustainable+and+Renewable+Energy+Division/OREDP.htm
[106] Ireland's Ocean Economy – Reference Year 2010; NUIG, SEMRU , Published Dec 2013.
[107] http://www.nowireland.ie/offshore-wind-ireland.html
[108] Blue Growth – Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts, Third Interim Report, 2012. http://ec.europa.eu/maritimeaffairs/documentation/studies/documents/blue_growth_third_interim_report_en.pdf
[109] http://www.westwave.ie/

4.1.3 Skills

The oil and gas industry relies on a flexible, mobile international workforce. There are many skilled Irish people working in the oil and gas industry abroad, but there is no indigenous industry to sustain employment. The range of skills required in this sector is very broad, however, there are some specialist technical skills including geological, geophysical, engineering, IT/computing and financial essential for oil and gas exploration and production[110]. In 2013, the UCD School of Geological Sciences introduced an MSc in Petroleum Geoscience which provides graduates with some of the skills for the oil and gas industry. Ireland, however, does not have a degree in petroleum engineering unlike universities in London and Aberdeen which have a long history in this area.

There are a few companies which provide specific training for the offshore oil and gas sector in Ireland. Effective Offshore[111] offers a range of courses that are specifically designed to provide the basic knowledge needed to work in the industry; courses include offshore safety, offshore emergency and rigger training. A more comprehensive list is in Table 4.11.

The publication "Innovation in the Blue Economy the EU"[112] has shown there is a demand for marine renewables skills at a European level, particularly in the offshore wind industry given the fast growth of the industry. A report carried out by Marine Research Industries Association[113] in 2011 into the third level education needs of the ocean energy industry in Ireland, found that the traditional disciplines of civil, mechanical and electrical engineering with other areas such as computer science, science – physics, chemistry and biology, mathematics and health and safety are fundamental to the industry. The report found that there was no real shortage of third-level skills in the nascent ocean energy industry but more was needed to attract young people into engineering generally. There will also be a need for engineers with experience of working in a demanding offshore environment, especially in roles such as process engineering, marine energy engineering, structural engineering and wave scientists.

4.2 Company Interviews

This section details the findings from the ten companies interviewed from the offshore Energy sector. There was a total of 704 employees within the companies interviewed representing approximately 61% of the total employment of 1,148 FTEs in the offshore energy sector in Ireland.

It is important to note that all the statistics in this section refer only to the companies interviewed and should not be extrapolated to the entire sector.

4.2.1 Turnover and Exports

Figure 4.1 shows that of the ten companies interviewed in the offshore energy sector, four companies (40%) stated that turnover had grown moderately (increased by approx. 10%-20% per annum) over the last three years while three (30%) stated turnover had grown significantly

[110] http://iooa.ie/

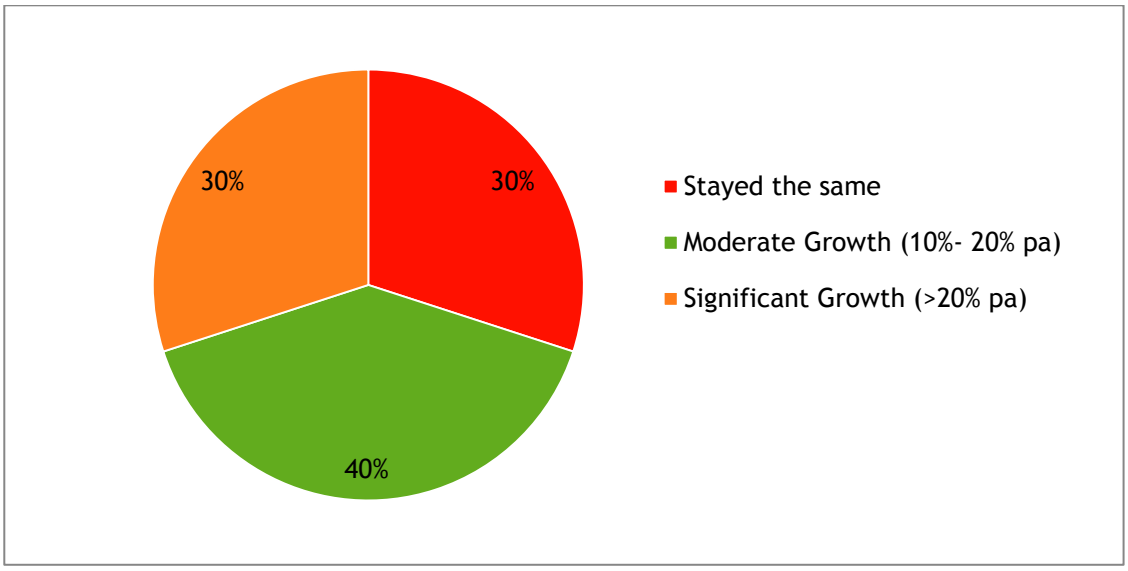
[111] http://www.effectiveoffshore.ie/index.php?option=com_content&view=category&layout=blog&id=24&Itemid=267

[112] Communication from the Commission. Innovation in the Blue Economy: realising the potential of our seas and oceans for jobs and growth. COM. 2014. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=COM:2014:254:REV1&from=EN http://ec.europa.eu/maritimeaffairs/policy/blue_growth/

[113] Third-Level Education Needs of the Ocean Energy Industry. To maximize the job and income creation potential of Ireland's ocean energy resource. Discussion Paper. MRIA. 2011. http://www.mria.ie/documents/92d05fb11cdab8d6531dd4cbb.pdf

(increased by more than 20% per annum) over the same period, while a further 30% indicated that turnover had stayed the same.

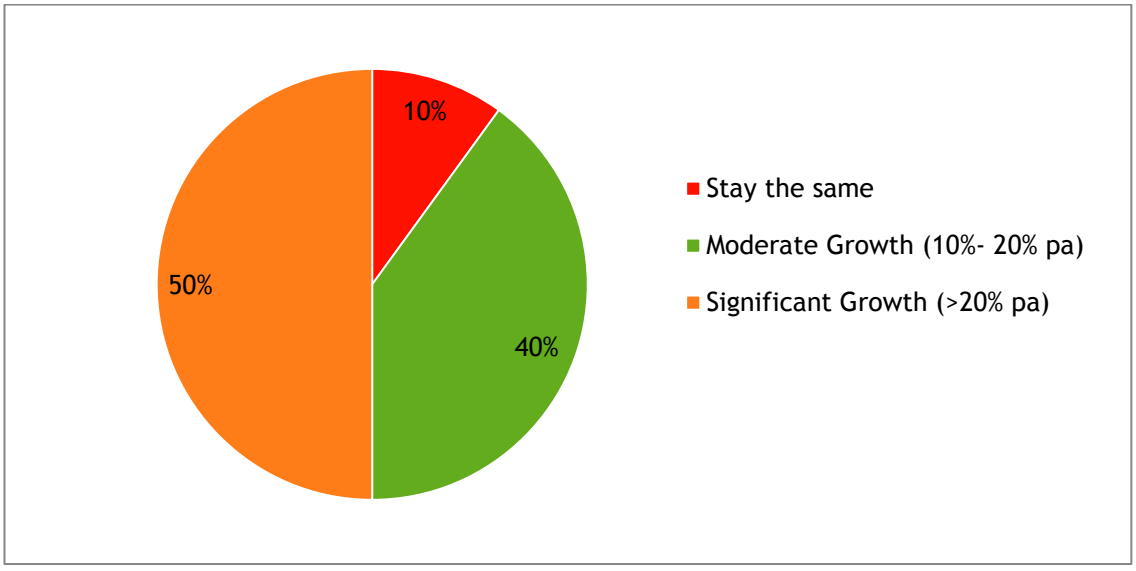
Figure 4.1: Percentage of Companies that experienced a Change in Turnover over the last 3 Years in the offshore Energy sector



Source: Company interviews – RSM McClure Watters, 2014

Figure 4.2 shows the level of export growth anticipated over the next six years by the companies interviewed. Half of the companies (five) expected levels of export to grow significantly (increase by more than 20% per annum) over the next six years while four companies (40%) expected levels of export to grow moderately (increase by approx. 10%-20% per annum) and the remaining one company expected levels to stay the same. The interviews with companies also found that on average, over the last three years approximately 49% of the turnover was from exports.

Figure 4.2: Anticipated Export Growth over the next 6 Years for the offshore Energy sector



Source: Company interviews – RSM McClure Watters, 2014

4.2.2 Employment Growth / Decline by Occupation

Companies were asked about their employment growth by occupation over the last three years and their anticipated growth for the next six years. Examples of job roles within the Energy Sector are outlined in Table 4.3.

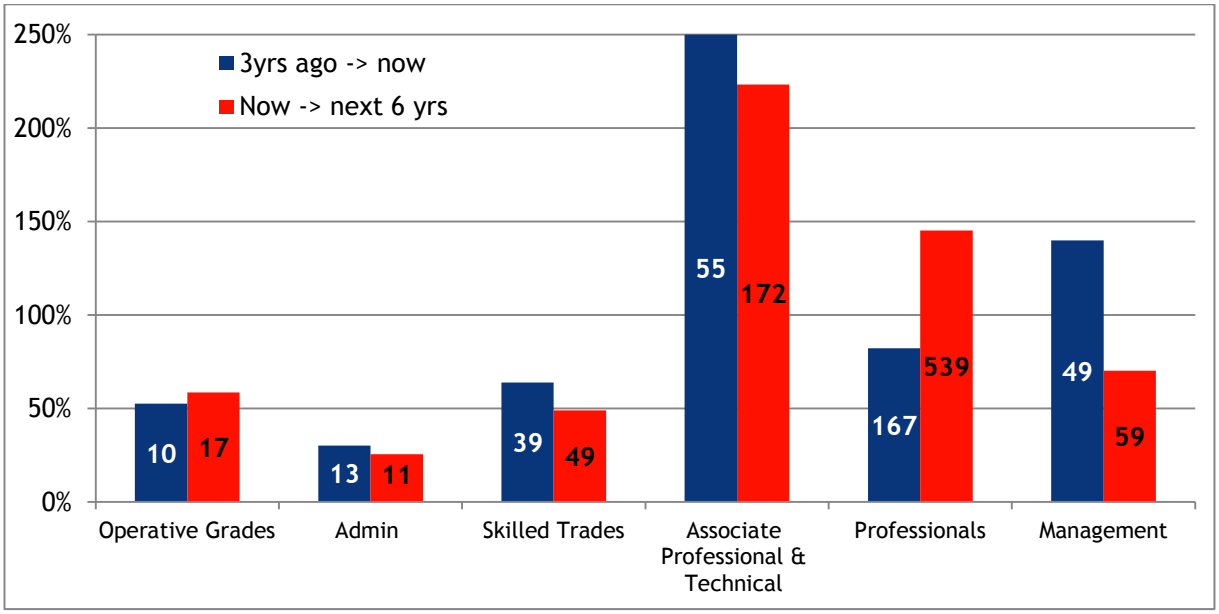
Table 4.3: Job Roles by occupational level in the offshore Energy Sector

Occupation Level	Job Roles
Operative Grades	General Operatives, Riggers, Boat Crew
Administration	HR staff, General Administrators, Receptionists
Skilled Trades	Mechanics, Electricians, Maintenance technicians, Fabrication and Welding Technicians, Divers
Associate Professional & Technical	IT Technicians, Software Development Technicians, Hardware Developers,
Professionals	Marine Energy Engineer, Drilling, Reservoir & Petroleum Engineers, Geoscientists/geo physicists, Hydrographic surveyors, Production & Facilities Engineers, Environmental & Chemical Engineers, Structural & Mechanical Engineers, Power Systems, Turbine Monitoring & Diagnostic and Smart Grid Engineers, Wave Scientists, Data Systems Analysts, Naval Architects, Marine Surveyors, Oceanographers, Marine Meteorologists, Energy Economists, Master Mariners and other Deck Officers, Engineering Officers
Management	Site Development Managers, Marine Operations Managers

Source: Our Ocean Wealth – Background Briefing Document, Part III, Enablers - Getting the Conditions Right for Growth (2012)

The companies interviewed highlighted that there had been significant employment growth in the Energy sector over the last three years. Figure 4.3 shows that the most significant employment growth over the last three years has been in the associate professional & technical and management occupations (250% and 140% respectively). The energy sector projected the highest employment growth of all sectors over the next six years, envisaging doubling the number employed at present, albeit from a low base. However, caution should be exercised when drawing conclusions from these figures due to the small sample base of ten companies. Over the next six years, companies interviewed indicated that they expected the most substantial employment growth in the Associate Professional & Technical and Professional occupations (225% and 145% respectively).

Figure 4.3: Employment Growth within the offshore Energy Sector*



Source: Company interviews – RSM McClure Watters, 2014

*Please note values are calculated as a percentage of growth from 3 years ago to now and now to the next 6 years, within specific occupations. The numbers stated in the above figure represent the number of employees companies have stated they have gained from 3 years ago to now and will need from now to the next 6 years.

4.2.3 Current and Required Skills Levels

Companies interviewed were asked about the current and future qualifications under the National Framework of Qualifications (NFQ) that they would require for the different occupations. (Table 4.4) The NFQ is detailed in Appendix 4.

While the number of employees within each category is, in some cases, very small and therefore the results may not be representative of the sector an interesting change is emerging which is seen across all the sectors of the marine economy, namely the increase in qualifications for Managers, Professional and Associate Professionals & Technical.

For Operatives the qualifications requirement is anticipated to increase to levels 4 - 5, from below level 4 at present, which is in line with Government policy of keeping people in school to complete their leaving certificate. The reduction in requirement from level 6-7 to level 4-5 is also to be expected as the economy picks up and those with qualifications at levels 6 & 7 will find employment commensurate with their educational attainment.

For administrative occupations and skilled trades the educational attainment required is not significantly different. Alternatively it could be that those with high educational attainment are taking jobs requiring lower qualifications so that they can obtain the experience of working in an offshore environment which is one of the skills issues that companies reported having difficulty recruiting.

Table 4.4: Current and anticipated NFQ Levels required by Occupation in the offshore Energy Sector

Occupation			NFQ Level									
	No.		<4		4-5		6-7		8		9-10	
	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future
Operative Grades	29	46	24%	0%	**38%**	**72%**	38%	28%	0%	0%	0%	0%
Administration	43	54	0%	0%	**47%**	**48%**	25%	28%	26%	20%	2%	4%
Skilled Trades	101	150	0%	0%	**75%**	**76%**	19%	17%	6%	7%	0%	0%
Associate Professional & Technical	77	249	0%	0%	14%	4%	11%	4%	7%	7%	**67%**	**85%**
Professionals	370	909	0%	0%	0%	0%	3%	0%	12%	8%	**85%**	**92%**
Management	84	143	2%	0%	0%	0%	10%	6%	**82%**	**88%**	6%	6%
Total	704	1,551										

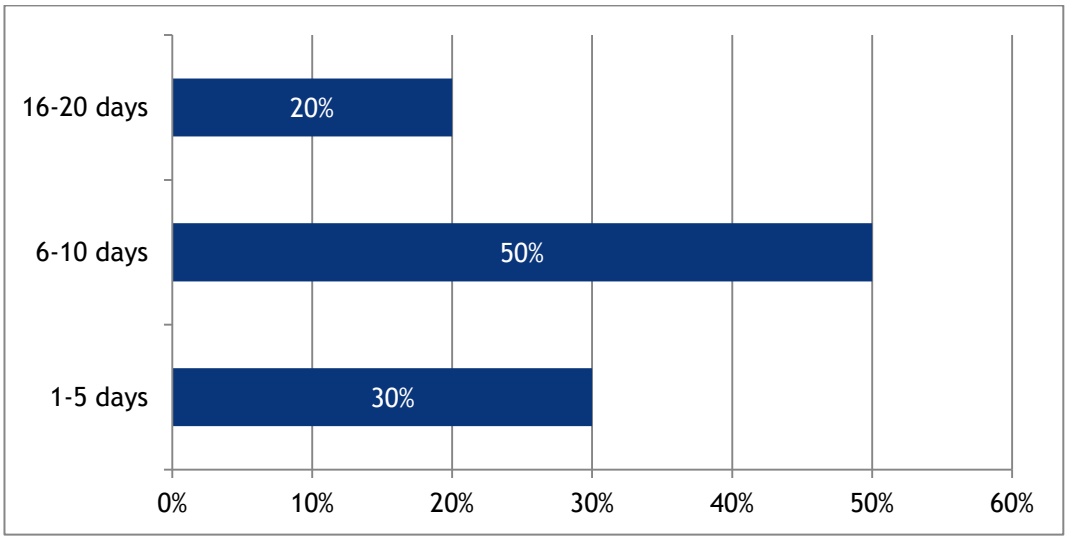
Source: Company interviews – RSM McClure Watters, 2014

Cells shaded indicate no significant change in NFQ level for the occupation, while cells shaded indicate a higher NFQ level required and cells shaded indicate a corresponding decline in NFQ required

4.2.4 Training and Development

The companies were also asked about training provision for their employees. Figure 4.4 shows that for the offshore energy sector 50% of the companies interviewed provided between 6-10 training days a year per employee.

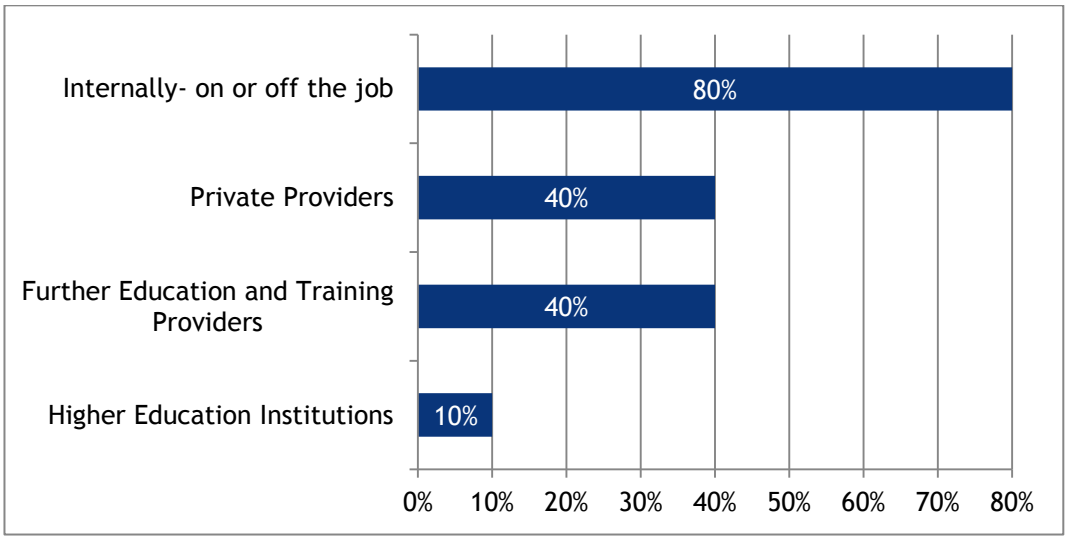
Figure 4.4: Number of Training Days in the offshore Energy sector



Source: Company interviews – RSM McClure Watters, 2014

Figure 4.5 shows that 80% of companies interviewed used in-house training and 40% used both private providers and Further Education and Training providers such as the ETBs. The higher education provider which emerged for vessel training and marine engineering was the National Maritime College of Ireland (NMCI).

Figure 4.5: How Training was delivered for the offshore Energy sector



Source: Company interviews – RSM McClure Watters, 2014

4.2.5 Availability of Personnel

Companies were asked about the availability of personnel with the relevant education, skills and expertise. A summary of the results in outlined in Table 4.5. Caution must be used in interpreting the data given the low levels of response.

Table 4.5: Availability of Personnel for the offshore Energy Sector

	Not enough people in my local area with right level of:					
	Education		Experience		Skills	
	N	%	N	%	N	%
Operative Grades	0	0%	1	10%	1	10%
Administration	0	0%	0	0%	0	0%
Skilled Trades	2	20%	3	30%	3	30%
Associate Professionals and Technical	2	20%	3	30%	3	30%
Professionals	2	20%	3	30%	4	40%
Management	2	20%	2	20%	2	20%
Base= 10						

Source: Company interviews – RSM McClure Watters, 2014

Table 4.5, indicates that companies have the most difficulty finding Professional and associate professionals and skilled trades (pink shaded cells) with the requisite experience and skills. This can be interpreted as a lack of experience working in an offshore environment. (Section 4.2.6)

4.2.6 Difficulties Filling Current Vacancies and Skills Supply

In the Energy sector, 70% of companies interviewed stated that they have roles which were difficult to recruit into, the main occupations identified were electrical and specialist engineers; people with offshore energy skills; Project managers with practical experience; people with basic technical skills (i.e. riggers; people with algae-biology experience; people with software data skills; and general tradesmen).

4.3 Stakeholder Consultation and Analysis

4.3.1 Offshore Oil and Gas

The Oil and Gas sector is a diverse industry ranging from production, exploration and the supply chains for these areas. Production facilities need engineering skills and one such example is the Corrib Gas Field which will employ approximately 131 people during its 10-15 year life of field production. For exploration, the skills needed are for scientific research activities and are typically MSc and PhD graduates. Increased exploration is anticipated following the announcement from the Department of Communications, Energy and Natural Resources (DCENR) for a licensing round in 2015[114]. However, the current fall in oil prices could have an impact on the exploration potential but a discovery could lead to demand for additional production facilities.

Initial seismic surveys are not likely to have an impact on employment and skills, although this will change if well drilling takes place on foot of these surveys. There will also be an increase in demand for port facilities and service vessels. An example of such a demand occurred following Corrib-related drilling activity in the Slyne Basin, with 214 offshore vessel movements in Killybegs; 620 additional flights at Donegal's Carrickfinn Airport and the industry generated €3 million in Killybegs during 2007.

Deep water ports will also be needed to support drilling activities (e.g. the location of the port facilities in Aberdeen resulted in the growth of an industry cluster servicing the North Sea oil and gas activities). In Ireland the Shannon Foynes Port Company or Cork Harbour have deep waters and could accommodate this activity. If the exploration resulted in a significant number of wells being drilled then exploration companies could end up establishing headquarters in Ireland.

A commercial discovery and the development of one or more offshore oil or gas fields have the potential to provide and stimulate the growth of high-end jobs. Currently a number of discoveries in the Porcupine and Celtic Sea basins are being appraised. Overall, there is cautious optimism that commercial development could occur in the next few years and one discovery could generate momentum. The skills needed to service these activities will be Levels 8 – 10 degrees, (honours degrees, Masters and PhDs) generally in engineering, geoscience and hydrography.

An offshore services group targeting business opportunities for Irish companies in the supply chain was established previously in anticipation of offshore oil and gas discoveries, though relatively little

[114] http://www.dcenr.gov.ie/NR/rdonlyres/9B40A9A2-10AE-4E6A-9382-1D07FC76A802/0/2015LicensingRoundNotice18June2014Final.pdf

activity followed compared to the likes of Aberdeen, which benefitted from the discoveries in the North Sea. However, the potential for major new oil finds for Scotland in the North Atlantic is being predicted which could open up a second oil boom and Ireland could benefit. This is an area being assessed by the HOOW Development Task Force and a major initiative is planned to ensure opportunities for rapid growth can be capitalised on.

4.3.2 Marine Renewable Energy

The emergence and rapid growth in the Marine Renewable Energy sector has been driven by European targets for generating renewable energy of which one way is to harness the huge renewable energy resources in the seas and oceans around North West Europe.

The UK leads worldwide in offshore wind energy, with 1,075 turbines (3,653MW) deployed, a pipeline for 8,000MW by 2016 envisaged and 18,000MW installed by 2020. The first demonstration project was deployed in UK waters in 2000 (Blyth – 4MW) and the first large scale array followed in late 2003 at North Hoyle (60MW). Employment since then has grown to current levels of 6,830 full time employees. The wave and tidal energy sectors are still at the demonstration stage, though the success of offshore wind deployments is expected to promote a similar growth trajectory over the next 5-10 years.

Ireland is particularly well placed to compete in this emerging sector and the Offshore Renewable Energy Development Plan (OREDP) published in 2014 by the DCENR identified scope to develop 4,500MW of offshore wind and 1,500MW of wave energy in Irish waters without any significant environmental impacts. At present there are 5 companies actively involved in developing offshore wind energy projects in Ireland, with sites at various stages in the permitting process, which involves environmental impact assessments and applications for grid connections. These sites could produce over 2,600MW, with an associated investment in excess of €8bn, and could be deployed within the next 3-5 years if agreements were reached with the UK to export the electricity generated.

For wave energy, ESB is developing a 5MW demonstration project called Westwave and was recently awarded over €20 million from Europe to help fund the building and operation of the project. The EU is supporting the establishment of the wave and tidal energy sectors and a European Ocean Energy Forum has been set up with the aim of having at least ten demonstration projects, like Westwave, deployed by 2020. Ireland has some of the best sites for wave energy in Europe and other members of the Marine Renewables Industry Association (MRIA) in Ireland are actively investigating options for sites to deploy demonstration projects.

Ireland has the potential to become a centre of excellence and a world leader in research, development and demonstration in the marine renewables field. Employment opportunities in this area are currently mostly for graduates, with little available for the time being for technical and skilled trades. Very specialist skills are needed in early stages as the sector becomes established and it is believed that this can be catered for by the current supply of graduates and post-graduates. Once demonstration projects are deployed there will be a need for vessel operators and maintenance technicians. Operatives can be brought in as contractors and the mobility associated with this workforce means that constraints are unlikely.

The taught masters in Marine Energy was recently launched by UCC in partnerships with seven other colleges, including Queens University in Belfast, following a consultation of stakeholders by the MRIA of the education needs of the industry.

4.4 Future Demand for Energy Skills, 2015 - 2020

4.4.1 Introduction

This section of the report deals with the future demand for skills in the Energy sector over the period 2015-2020, arising from growth of the sector and the replacement of workers arising from exits to inactivity and net losses from inter-occupational movements, referred to as expansion and replacement demand respectively.

Scenario 1 assumes that the turnover targets set out in HOOW will be met by 2020. By taking these targets and translating them into numbers of jobs, the demand for skills for the different jobs out to 2020 is forecast. Consultations with industry stakeholders, informed by the economic background data gathered, were used to determine how this increase in turnover could be achieved, how the additional turnover would be distributed between the various industries making up the offshore Energy sector and how employment would need to increase in order to generate this turnover. A modelling exercise was then conducted using the information from the company interviews to estimate how the expansion demand would be distributed by occupational grade in each sub-sector over the period 2015-2020.

An estimation of the replacement demand was also conducted using data provided by the SLMRU (Skills and Labour Market Research Unit, SOLAS) and following the methodology used by them in the publication of the EGFSN National Skills Bulletin[115] on the exits from employment to economic inactivity and net losses from inter-occupational movements, which vary by occupation .

4.4.2 Scenario 1: Achieving the HOOW targets

4.4.2.1 Scenario 1 Summary

In summary, the collected view of the consulted stakeholders, shaped by the available economic data and published forecasts, is that if the HOOW turnover targets are achieved the offshore energy sector will expand by an additional 150 FTE between 2015 and 2020. The Oil and Gas industry will remain at its 2010 level of employment, while the expansion demand of 150 FTE will be in Marine Renewable Energy predominantly in engineering services and R&D.

4.4.2.2 Assumptions for Oil and Gas: Scenario 1

Under this scenario, Oil and Gas employment is projected to remain constant from 2010 to 2020. See Scenario 2 – the accelerated growth scenario, in Section 4.4.4 for evidence on potential developments which could raise employment in the sector.

[115] http://www.skillsireland.ie/media/23072014-National_Skills_Bulletin%20_2014--Publication.pdf

4.4.2.3 Assumptions for Marine Renewable Energy: Scenario 1

As an emerging industry, Marine Renewable Energy employment grew very rapidly from 2007 to 2010. For this scenario, following discussions with stakeholders and examination of forecasts of employment in scientific and technical occupations, we have assumed continued growth at a lower rate, leading to a baseline position of 286 FTE in 2014 and an additional 150 FTE between 2015 and 2020. Scenario 2 – the accelerated growth scenario presented in Section 4.4.4 sets out evidence on potential developments which could maintain the level of growth which was displayed in the early stages of this new industry. Scenario 1 - the baseline scenario, represents a continuation of growth based on existing developments and investments.

4.4.3 Employment and Skills Implications

The distribution of the expansion demand of 150 additional FTE jobs by occupation level is shown in Table 4.6. The first column shows the 2014 FTE baseline estimate by occupation level. The next set of columns presents the expansion demand, the percentage of that figure to the 2014 baseline estimate for that occupation level and the percentage of the occupation expansion to the total expansion demand. Then follows the replacement demand - those leaving, e.g. due to retirement or change of occupation. The gross demand is the sum of the expansion and replacement and is the true reflection of the skills demand for the sector. Summed across the period 2015-2020, the total number of workers leaving is estimated to be 403 FTEs, known as the replacement demand, which when summed with the expansion demand of 153 FTEs gives a gross demand of 553 FTE employees.

Table 4.6: Distribution of Expansion and Replacement demand by occupation level for **Scenario 1** for the **offshore Energy sector**

Occupation Level	2014 Baseline Estimate	% 2014 Total Baseline	Expansion Demand 2014-2020		% of Expansion demand	Replacement Demand 2014-2020		% of Replacement demand	Gross Demand		% of Gross demand
			No.	% of 2014		No.	% of 2014		No.	% of 2014	
Operatives	47	4%	3	6%	2%	23	49%	6%	26	55%	5%
Administrative	70	6%	2	3%	1%	32	46%	8%	34	49%	6%
Skilled Trades	166	14%	8	5%	5%	67	40%	17%	75	45%	14%
Associate Professionals & Technical	125	11%	31	25%	21%	41	33%	10%	72	58%	13%
Professionals	603	53%	96	16%	64%	204	34%	51%	300	50%	54%
Managers	137	12%	10	7%	7%	36	26%	9%	46	34%	8%
Total	**1,148**		**150**	**13%**		**403**	**35%**		**553**	**48%**	

Source: PACEC, 2014

The occupation group with the largest expansion demand is "professionals" which is in line with the fact that this is still an emerging sector and the initial expansion will require more professionals, in particular engineers. There is also a small expansion demand for associate professional and technical personnel.

A further source of demand for skills is the replacement demand which is estimated to be 403 FTEs. The largest replacement demand is for professionals at 204 FTEs which is 51% of the total replacement demand. This is in line with the figure of 53% of the total 2014 workforce being professionals and it is therefore not surprising that professionals are also the largest replacement category.

The gross demand over the period to 2020 is the sum of the expansion and replacement demand and is 553 FTEs.

The distribution of expansion demand of 150 additional FTE jobs by educational attainment is shown in Table 4.7. The demand is concentrated in levels 9 - 10 of the framework (Masters degree, Postgraduate diploma and Doctoral degree). This is driven by an increase in the number of workers in professional and associate professional occupations (127 of the150 total).

Table 4.7: Distribution of Expansion demand by Educational Attainment for **Scenario 1** for the offshore **Energy** sector

NFQ Level	Description	Expansion Demand
4 - 5	Secondary School Leaving Certificate	10
6 - 7	Higher Certificate / Advanced Certificate or Bachelors Degree	2
8	Honours Degree or Higher Diploma	17
9 - 10	Masters Degree / Postgraduate Diploma or Doctoral Degree	121
Net Total		**150**

Source: Company interviews – RSM McClure Watters, 2014

4.4.4 Scenario 2: Accelerated Growth in Energy Sectors

The stakeholders were also asked to consider the potential developments which may drive growth over and above the HOOW turnover targets, such as oil and gas exploration and the implementation of the Offshore Renewable Energy Development Plan (and realisation of its job creation and growth aspirations), and what the impacts of these developments may be. Their views have been used to prepare an additional scenario, Scenario 2, reflecting accelerated growth throughout the offshore energy sectors.

4.4.4.1 Summary of Scenario 2

Under the accelerated growth scenario, the collected view of the stakeholders is that the energy sector could expand by an additional 400 FTE by 2020. The Oil and Gas industry will need 100 additional FTE in high tech consultancy and specialist engineering services; while expansion demand in Marine Renewable Energy will equate to 300 additional FTE by 2020 in engineering services and R&D.

4.4.4.2 Assumptions for Oil and Gas: Scenario 2:

The main drivers behind the expansion of the oil and gas industry are as follows:

- Current seismic surveying activity;
- The 2015 Atlantic Margin oil and gas exploration licensing round[116];
- The new fiscal terms for offshore oil and gas exploration and production which provides industry with the certainty necessary to invest in exploration offshore Ireland; and
- IMERC (the Irish Maritime and Energy Resource Cluster) providing companies with the opportunity to promote products and services in a collaborative manner to global Oil and Gas companies and increase interests off the Irish coast.

The consensus position among the stakeholders was that this could lead to an increase in employment of 100 FTEs.

4.4.4.3 Assumptions for Marine Renewable Energy: Scenario 2

The main drivers behind growth in the Marine Renewable Energy Industry are:

- The Offshore Renewable Energy Development Plan, involving:
  - Increased exchequer support of €26.3m from 2013 – 2016 for ocean energy research and demonstration;
  - A feed in tariff of €260 per MWh for ocean energy arrays up to 30MW in size;
  - An additional €30m capital grant for the prototype development fund in the 2016 – 2018 period for demonstration projects; and
  - Export of offshore wind to the UK market through Inter-Governmental Agreement (IGA);
- The MaREI (Marine Renewable Energy Ireland) centre – with €29.5m funding from SFI and 40+ industry partners.
- ESB's "Westwave" demonstration wave farm - awarded €23.5m of NER300 funding from the European Commission towards Ireland's first wave energy project, with proposed delivery of the WestWave project in 2018
- The IMERC campus, along with supports from Enterprise Ireland and IDA to promote new start-ups and attract FDI companies
- Horizon 2020 funding for research and demonstration of new technologies
- Continued investment in research infrastructure and test sites for wave energy established in Ireland, e.g., SmartBay in Galway and the Atlantic Marine Energy Test Site (AMETS) in Belmullet.

These additional jobs could be created from the initiation of five micro businesses creating 3-5 jobs each, ten SMEs creating 15-20 jobs each and two FDI creating 50 jobs each, e.g., the Irish start-up Open Hydro now has over 90 employees following investment from the French company the DCNS Group. The new jobs will require candidates to be educated to at least degree level, ideally to have

[116] The Minister of State for Natural Resources, Fergus O'Dowd TD, announced the details of the 2015 Atlantic Margin oil and gas exploration licensing round on 18th June. The round will close in September 2015 and will include all of Ireland's major Atlantic basins: Porcupine, Goban Spur, Slyne, Erris, Donegal and Rockall. The form of concession on offer will be a two-year licensing option.

offshore energy skills, although through consultations with Mainstream Renewable Power, this seems to be a skill which is difficult to source. Other examples of potential job creation include new companies choosing to relocate to Ireland, for example at IMERC, and Exceedence, a new spin-out company from UCC bidding for Horizon 2020 funding which would create 3 FTEs.

4.4.5 Employment and Skills Implications

The distribution of the expansion demand of 400 additional FTE jobs by occupation level is shown in Table 4.8. As for Table 4.6 the first column shows the 2014 FTE baseline estimate by occupation level. The next set of columns presents the expansion demand, the percentage of that figure to the 2014 baseline estimate for that occupation level and the percentage of the occupation expansion to the total expansion demand. Then follows the replacement demand - those leaving, e.g. due to retirement or change of occupation. The gross demand is the sum of the expansion and replacement and is the true reflection of the skills demand for the sector. Summed across the period 2015-2020, the replacement demand is estimated to be 429 FTEs giving rise to a total gross demand over the period of 829 FTEs.

More than half the expansion demand (65%) and the replacement demand (51%) is for professional occupations such as electrical, mechanical and software engineers, geologists, geophysicists, applied physicists and biochemical and environmental scientists (as identified from the company interviews).

Table 4.8: Distribution of Expansion and Replacement Demand by occupation level for **Scenario 2** for the **offshore Energy sector**

Occupation Level	2014 Baseline Estimate	% 2014 Total Baseline	Expansion Demand 2014-2020		% of Expansion demand	Replacement Demand 2014-2020		% of Replacement demand	Gross Demand		% of Gross demand
			No.	% of 2014		No.	% of 2014		No.	% of 2014	
Operatives	47	4%	8	17%	2%	24	51%	6%	32	68%	4%
Administrative	70	6%	5	7%	1%	32	46%	7%	37	53%	4%
Skilled Trades	166	14%	22	13%	6%	69	42%	16%	91	55%	11%
Associate Professionals & Technical	125	11%	82	66%	21%	46	37%	11%	128	102%	15%
Professionals	603	53%	258	43%	65%	220	36%	51%	478	79%	58%
Managers	137	12%	25	18%	6%	38	28%	9%	63	46%	8%
Total	**1,148**		**400**	**35%**		**429**	**37%**		**829**	**72%**	

Source: PACEC, 2014

The distribution of the expansion demand (400 additional FTE jobs) educational attainment (NFQ level) is shown in Table 4.9. These have been estimated by combining the scenario projections of

jobs growth with the responses from the company interviews on the distribution of occupations and educational attainment among current and likely future workers. As with the baseline scenario (Scenario 1), the demand is concentrated in levels 9 and 10 of the framework (Doctoral and Masters Degrees). This is driven by a large increase in the number of workers in professional occupations - 258 of the 400 total (65%).

Table 4.9: Distribution of Expansion demand by Educational Attainment for **Scenario 2** for the offshore Energy sector

NFQ Level	Description	Expansion Demand
4 - 5	Secondary School Leaving Certificate	28
6 - 7	Higher Certificate / Advanced Certificate or Bachelors Degree	5
8	Honours Degree or Higher Diploma	46
9 - 10	Masters Degree / Postgraduate Diploma or Doctoral Degree	321
Net Total		**400**

Source: Company interviews – RSM McClure Watters, 2014

4.5 Supply Side Information – Offshore Energy

The offshore Energy Sector has two distinct sub-sectors: Off-Shore Oil and Gas Exploration and Production and Marine Renewable Energy. While there are many overlapping skill sets required for both, e.g., engineering and working off-shore skills the focus here is on the specific technical skills required for each sub-sector. In addition to the industry specific education and training listed here the marine safety training outlined in the previous section will also apply to many people working in the off-shore energy sector. Marine and Environmental Scientists, whose education and training are listed in the section on Seafood and Bio-Products, will also be employed by the off-shore industry as it has to meet many Environmental Directives.

4.5.1 Oil and Gas Exploration and Production

The one year MSc in Petroleum Geoscience at UCD, which was launched in Sept 2013, offers science graduates a vocational training in the broad range of technical fields associated with the exploration and production of the petroleum industry. The course reflects the multi-disciplinary nature of petroleum geosciences, with modules extending from the geological through to reservoir engineering and practical experience in the industry.

Table 4.10: Petroleum Geoscience Course Details

Course Title	Institution	Award	Duration	2013 intake
Petroleum Geoscience	UCD	MSc	1 Year	10

Source: List compiled by EGFSN-DJEI, Nov 2014

In addition to the formal professional qualifications, specific training and qualification is required by the oil and gas industry before anyone can work on an oil rig. OPITO – Offshore Petroleum Industry Training Organisation- is the skills organisation for the oil and gas industry. It originated in the UK in 1977 to address the skills gaps between traditional industry and the oil and gas industry and to up-skill existing workers. It is now an international organisation with offices in Aberdeen, Kuala Lumpur, Dubai and Houston. OPITO works with Governments, national oil companies, multi-nationals and contractors to help them meet their skills needs through, among other things, the provision of occupational standards and qualifications and quality assurance of training delivery. Working closely with the oil and gas industry OPITO identifies the needs and requirements for new and improved technical standards that play a pivotal part in the training and assessing of oil and gas employees.

Employers worldwide use OPITO Technical Standards to ensure that technicians working in the oil and gas industry have the knowledge and competence to work on and offshore. Training centres and employers can apply for approval to deliver technical training and assessment in line with these standards. The approval procedure and monitoring activity is a robust process and ensures that training is safe and quality assured with competence based, consistent outcomes.

Two organisations in Ireland are approved by OPITO to provide training. They are:

- Effective Offshore in Falcarragh, Co. Donegal and
- NMCI in association with SEFtec in Ringaskiddy Co. Cork.

The OPITO approved courses provided by Effective Offshore and NMCI/SEFtec for working offshore are listed in Table 4.11.

Close to 2,000 people received OPITO training in 2013 with the majority being for BOSIET (Basic Offshore Safety Induction and Emergency Training) followed by MIST (Minimum Industry Safety Training). While it has not been possible to follow up with all those that did receive training, 52% of those that did respond to a survey were in employment. The people who attend for this training are a mixture between those who already have a job offer subject to their obtaining the requisite training, are unemployed technicians (fitters, welders, electricians, construction labourers etc.) and those who would like to get into the offshore industry. The Department of Social Protection (DSP) provides up to €500 for unemployed people to partake in this training.

Cork County ETB (formerly FÁS training centre) provides an “Access to Offshore” course. The next course is scheduled for June 2015. This is a 3 week course and includes the MIST and BOSIET OPITO training and the Oil and Gas Medical which is a medical certificate required by the oil and gas industry before a person can work in the offshore environment. This course also has a module on Career planning and Job Seeking Skills. Applicants apply through their local Employment/Intreo office.

In addition to its OPITO approval, Effective Offshore is also approved to provide IRATA Rope Access training. IRATA (Industrial Rope Access Trade Association) is the global trade association for the “work-at-height sector” with member companies in every continent. Industrial rope access has been developed by IRATA in the last 25 years to a point where it is the chosen means of access for much of the work in the offshore oil and gas industry. IRATA International has a formal training and certification scheme. Rope access technicians are grouped into three technical grades, depending upon their experience and level of assessment as set out in the IRATA International publication Training, Assessment and Certification Scheme (TACS).

Table 4.11: Offshore Training Courses

Course Title	Provider	Approval	Duration
Offshore - Minimum Industry Safety Training (MIST)	Effective Offshore & NMCI/SEFtec	OPITO approved	2 days
Basic Offshore Safety Induction & Emergency Training (BOSIET)	Effective Offshore & NMCI/SEFtec	OPITO approved	3 days
Further Offshore Emergency Training (FOET)	Effective Offshore & NMCI/SEFtec	OPITO approved	1 day
HUET (Helicopter Underwater Escape Training): incl Compressed Air Emergency Breathing Systems (EBS)	Effective Offshore & NMCI/SEFtec	OPITO approved (HUET) & EBS	½ day & 1 day
(TEMPSC)[117] Offshore Lifeboat Coxswain Initial Twinfall Training	NMCI/SEFtec	OPITO approved	4 days
(TEMPSC) Offshore Lifeboat Coxswain Freefall Supplementary Training	NMCI/SEFtec	OPITO approved	1 day
(TEMPSC) Offshore Lifeboat Coxswain Training	NMCI/SEFtec	OPITO approved	2 days
Rigger Training Stage 1	Effective Offshore	OPITO approved	3 days
Rigger Competence Stage 3 and 4	Effective Offshore	OPITO approved	2 days
Banksman & Slinging Operations Stage 1	Effective Offshore	OPITO approved	3 days
Rope Access: Level 1,2 and 3	Effective Offshore	IRATA approved*	5 days

Source: List compiled by EGFSN-DJEI, Nov 2014

4.5.2 Marine Renewable Energy – Offshore Wind, Wave and Tidal

4.5.2.1 Overview

The Marine Renewable energy sector is still an emerging sector and its current skills needs are more for researchers at this point in time until the industry is more developed and then it will have a greater need for associate professionals and technicians. Table 4.12 lists the engineering courses that were identified with the marine renewable energy sector. With regard to undergraduates the industry prefers students to undertake the traditional engineering degree such as mechanical and electrical and then to specialise afterwards.

[117] TEMPSC - Totally Enclosed Motor Propelled Survival Craft

Table 4.12: Engineering courses identified with the marine renewable energy sector

Course Title	Institution	Award	Duration
Engineering Technology with 1 optional Marine Engineering module	Colaiste chomain - Gaelo choláiste Ros Dumhach (Ballina) (Mayo-Sligo-Leitrim ETB)	Level 5 Certificate	1 year
Engineering - Mechanical Engineering and Renewable Energy	Athlone Institute of Technology -**AIT**	BEng	
Energy Communications Infrastructure	Athlone Institute of Technology -**AIT**	M.E.Eng	15 months
Marine Renewable Energy	**UCC** - (All Island taught Masters in MRE)	MEngSc	1 year
MaREI - Marine Renewable Energy Ireland	UCC, NUIG, NUIM, UL, UCD and CIT	MScResearch	
Renewable Energy Engineering	University of Ulster - **UU**	BBng	4 years
Renewable Energy Engineering	University of Ulster - **UU**	MEng	5 years

Source: List compiled by EGFSN-DJEI, Nov 2014

The Energy Communications Infrastructure Masters is designed for Civil and Structural engineering graduates to give them an opportunity to move into the Marine Renewable Sector to work on the infrastructural requirements of the industry.

4.5.2.2 MaREI – Marine Renewable Energy Ireland

MaREI is an SFI research centre comprising a cluster of key third level institutions (UCC, CIT, UL, NUIG, UCD and Maynooth University) and industrial partners dedicated to solving the main scientific, technological and socio-economic challenges related to marine renewable energy. These challenges require innovative solutions to reduce time to market and reduce costs to a competitive level. They cover all aspects of the technology development and require solutions to engineering problems, energy conversion and storage transmission and integration as well as the enabling ICT technologies and environmental aspects.

The nucleus of MaREI originates from well-established MRE (Marine Renewable Energy)-related research entities distributed throughout Ireland. The research teams comprise internationally recognised experts from each of the six participating third level institutions, who have complementary research backgrounds key to providing the underpinning research necessary for Ireland to achieve a commercially successful MRE industry. The multidisciplinary nature of the group reflects the breadth of expertise required to support the R&D requirements of the emerging MRE industry, both in Ireland and abroad. The main administrative and management activities are located at UCC's new Beaufort Laboratory; and the research is conducted across all the participating institutions.

The MaREI Research Programme aims to transform the MRE sector in Ireland by delivering science-based engineering solutions to the large-scale deployment of ocean energy devices. These devices

will be required to operate cost-effectively in hostile and complex ocean environments. The Research Programme is closely aligned to the partner companies' research and development strategies, and addresses the real needs of both the companies involved and the Marine Renewable Energy sector as a whole.

The MaREI Research Programme operates on a hub (or platform) and spoke model. It is organised into four Platform Themes (P1-4), which conduct the scientific research that underpins the development of the MRE-sector, and five Spokes (S1-5) that contain targeted projects, pertinent to the industry partners. It is anticipated that additional spokes will be added in the future, as dictated by research needs, within which further associated targeted projects will be carried out. The core Platform and Spoke project categories are as follows:

Platform Projects:

- P1 = Wave Energy Device Design Innovation and Optimisation
- P2 = Marine Electro-gas
- P3 = Marine Renewable Energy Informatics Tools
- P4 = Cost Reduction for Marine Renewable Energy

Spoke Projects:

- S1 = Marine Renewable Energy Devices
- S2 = Novel Materials for MRE Systems
- S3 = Power Take-Off and Energy Storage for MRE
- S4 = Operations Support Engineering
- S5 = MRE Decision Support and Data Management

The All-Island Masters Degree in Marine Renewable Energy is a 12-month, full-time taught Masters in Engineering Science, which is hosted by University College Cork, and involves heavy participation by MaREI lecturers and staff members. The programme is delivered in conjunction with UCD, Maynooth University, NUIG, UL, CIT, DIT and Queens University Belfast. It was launched in 2013, with an intake of 12 students in the inaugural year. A key component of the Masters programme is an industry-focused project, whereby students develop a topic in collaboration with an industry partner, and spend 3 months on placement with the partner, carrying the project to completion. The programme covers a range of engineering and non-engineering topics relevant to the Marine Renewable Energy (MRE) industry, with specially-developed advanced modules in MRE which are not available in any other Masters course, which seek to satisfy the increasing demand for suitably-qualified professionals in the MRE sector. This Masters was developed following extensive consultation with the industry.

4.5.2.3 The Global Wind Organisation

The Global Wind Organisation (GWO) is an association of Wind Turbine owners and manufacturers whose aim is to support an injury free work environment for the construction and operation of wind farms both on- and off-shore. To support this aim the GWO has developed a standard for Basic Safety Training for personnel working on wind farms. While the focus of this study is on off-shore wind, the Basic Safety Training requirement is the same for both on- and off-shore with the exception for the sea survival course for the off-shore wind farms. Several hundred people

undertake the Basic Safety Training in a given year. Many of these have worked in the building industry and undertake this training in order to get into this industry. Many will start out working on land wind farms and when they have gained more experience they will move on to working off-shore as the money is better. It has not been possible to obtain data regarding the numbers who go to work off-shore compared to the numbers who undertake the windfarm training.

This Basic Safety Training (BST) standard comprises 4 modules with and additional Sea Survival Module for working on off-shore wind farms. These are:

- First Aid 2 days
- Manual Handling ½ day
- Fire Awareness ½ day
- Working at Height 2 days

Total – 5 days for Basic Safety Training Standard

- Sea Survival 2 days

Three organisations in Ireland are approved by GWO to provide the four main modules of the Basic Safety Training standard. They are:

- ARCH – (Access Rescue Consulting at Height), a UK company with a training facility in Shannon Airport, Co Clare; (They also have a training location in Belfast) ARCH also provides IRATA Rope Access Training - see section on Oil and Gas exploration above.
- Renewables Academy (formerly Daralinn), Wexford; and
- Safety Technology (a UK company) in partnership with Letterkenny Institute of Technology, Killybegs, Co. Dublin

Effective Offshore in Falcarragh which specialises in training for the offshore sector has GWO approval to provide the fifth "Sea survival" module. Those who have obtained training in any of the first three organisations and who wish to work on off-shore wind farms can complete their training in Effective Offshore.

4.6 Summary

The 2010 figures show that the Irish Oil and Gas subsector employed 861 FTEs, had a turnover of €126 million and added a direct gross value of €61 million to the Irish economy while the marine renewable sector employed 216 direct FTE, more than double the 2007 figure of 101.

In Scenario 1 – achieving the HOOW targets by 2020, the energy sector will create 150 new jobs. in the Marine Renewable Energy sub-sector. Replacement demand would require a further 403 FTE, leading to a total gross demand of 553. Over half of the demand (300 FTE) is for professionals.

Under Scenario 2 -accelerated Growth, 400 new jobs would be created with the Oil and Gas industry needing 100 and Marine Renewable Energy 300. The replacement demand under this scenario would be 429, giving a total gross demand of 829 FTE of which 478 of these positions are for professionals in engineering and R&D.

The oil and gas industry relies on a flexible, mobile international workforce. As there is no indigenous industry to sustain oil and gas workers they need to travel for work, however with a critical mass becoming established and momentum from promising discoveries, Ireland could be seen as the place for global employers to locate and the demand for skilled employees would significantly increase.

Chapter 5: Marine Tourism

Sub-sectors
▪ Marine Tourism
▪ International Cruise Industry

5.1 Economic Profile

Using a broad definition for marine tourism which refers to marine and coastal tourism water based activities as well as the activities and services adjacent to the coastline, Fáilte Ireland, in 2013, estimated that marine tourism accounts for 10% of the overall value of the tourism revenue in Ireland[118]. Marine tourism activities include angling, water sports and seaside/resort trips. Fáilte Ireland estimated that in 2010 tourism expenditure in Ireland was approximately €5.8 billion [119].

The SEMRU 2010 economic indicators for the Marine Tourism sector are summarised in Table 5.1:

Table 5.1: 2010 Economic Indicators for the Marine Tourism sector

Sub-sector	Direct Employment (FTE)	GVA (€millions)	Turnover (€millions)
Marine Tourism and Leisure	3,502	337	841[120]
International Cruise Industry	N/A	N/A	17
Total	**3,502**	**337**	**858**

Source: SEMRU, Ocean Economy Report 2013 (data unavailable for cruise tourism)

In 2010, Marine Tourism and Leisure had a turnover of €841 million, a GVA of €337 million and employed 3,502 FTEs. These numbers are lower than the 2007 figures which stated a turnover of €944 million, a GVA of €453 million and full time direct employment of 5,836 people[121]. This decrease reflects the global downturn in the economy during this period.

The most recent official data is the 2010 data provided by SEMRU (Socio-Economic Marine Research Unit in NUIG). The first Ocean Economy Report, published in 2010, was based on the reference year 2007, at the height of the economic boom (2003 – 2007). The latest report, with a reference year of 2010 and published in December 2013, represents the lowest point of the economic contraction (2007 – 2010) and a significant decrease in activity. In order to develop forecasts of the future skills

[118] http://www.failteireland.ie/Utility/News-Features/News-Library/Significant-growth-in-marine-tourism-achievable.aspx
[119] http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/3_General_Surveys Reports/Tourism-Facts-2010-FINAL-v2.pdf?ext=.pdf
[120] The €841 million figure is greater than 10% of the overall tourism figure of €5.8 million, however, the figures compiled by SEMRU include Marine Leisure which is not included in Fáilte Ireland's figures.
[121] SEMRU – Ireland's Ocean Economy, 2013

demand to 2020, baseline estimates for 2014 were produced[122], using additional sources of information, such as: annual CSO (Central Statistics Office) employment trend data for broad sectors; Economic and Social Research Institute (ESRI) Medium Term Review (MTR) 2013 – 2020 and SOLAS Occupational Employment Projection 2020 (Jan 2014); results from company surveys; and discussions with stakeholders. The consensus position from the stakeholder discussions was that despite the loss of employment during the recession, the prospects for growth were strong, and any continuation of the fall in employment which took place between 2007 and 2010 would have recovered by 2014. As such the 2010 employment figure has been used as the best estimate of the 2014 baseline.

Table 5.2: Marine Tourism profile – FTE Direct Employment 2007, 2010, 2014 (estimated)

Sub-sector	2007‡	2010‡	2014*
Marine Tourism and Leisure	5,836	3,502	3,502

‡: SEMRU Data from Ireland's Ocean Economy, Ref Year 2007, (2010) and Ref year 2010 (2013)
*: 2014 baseline estimates based on the 2010 data developed by PACEC

One of the recent major Marine Tourism developments has been The Wild Atlantic Way project[123] which is a long-distance driving route stretching along the Atlantic coast from Donegal to West Cork and will achieve greater visibility for the west coast of Ireland in overseas tourist markets. Harnessing Our Ocean Wealth sets out a target for an increase in turnover to €1.5 billion in marine and coastal tourism and leisure (including cruise tourism) by 2020.

Since the launch of Cruise Ireland[124] in 1994, the island of Ireland has enjoyed significant success in the cruise sector with the number of ships increasing from 65 in 1994 to 202 in 2010. In Ireland, the main ports of call for cruise liners include Cork, Dublin, Waterford and Galway[125]. In 2012, the largest cruise ports in Ireland recorded positive cruise traffic levels, with Dublin Port and the Port of Cork receiving 87 and 57 cruise vessel calls respectively and Dun Laoghaire receiving 14 cruise vessels in 2013. Currently there are concerns regarding lack of infrastructure at Irish ports to handle the increased amount of cruise liners in Irish docks[126].

There has also been a positive trend in passenger visits to Irish ports with an increase of over 200% in the last decade from 64,376 to 204,489 in 2010. In 2010 there was an average of 1,012 passengers per port call and an average expenditure of €71 per person. Overall the total expenditure of cruise passengers in 2010 was €17 million [127]. The EU Blue Growth Study[128] also identifies Cruise Tourism as one of the most promising activities/markets for Europe.

[122] The 2014 employment estimates were based on the SEMRU 2010 data which was the latest available data at the time. SEMRU are currently updating the 2010 data and will publish the 2012 figures later in 2015. The SEMRU publication will also present 2014 estimates but based on 2012 data.
[123] http://www.failteireland.ie/wildatlanticway
[124] www.cruiseireland.ie - Cruise Ireland is a marketing co-operative, which was formed in 1994 to promote the island of Ireland as a premier cruise destination
[125] http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/1_Sectoral_SurveysReports/ReportCruiseTourismIreland.pdf?ext=.pdf "Cruise Tourism to Ireland Research Report – 2010"
[126] Department of Transport, Tourism and Sport, National Ports Policy Review
[127] "Cruise Tourism to Ireland Research Report – 2010"
[128] Blue Growth – Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts, Third Interim Report, 2012.

5.1.1 Skills

A report by the EGFSN titled '*Key Skills for Enterprise to Trade Internationally*'[129] included a section on skills and talent needed to drive Ireland's tourism sector. Specifically business planning, risk management, marketing, selling, e-commerce and language learning are identified as key areas of skill development which must be tackled in order to deliver the highest standards of service. It recommended that training programmes be developed at NFQ Levels 6 and 7 for employees, in partnership with tourism businesses, in a continuing professional development format and with a flexible delivery mode to address the issue.

5.2 Company Interviews

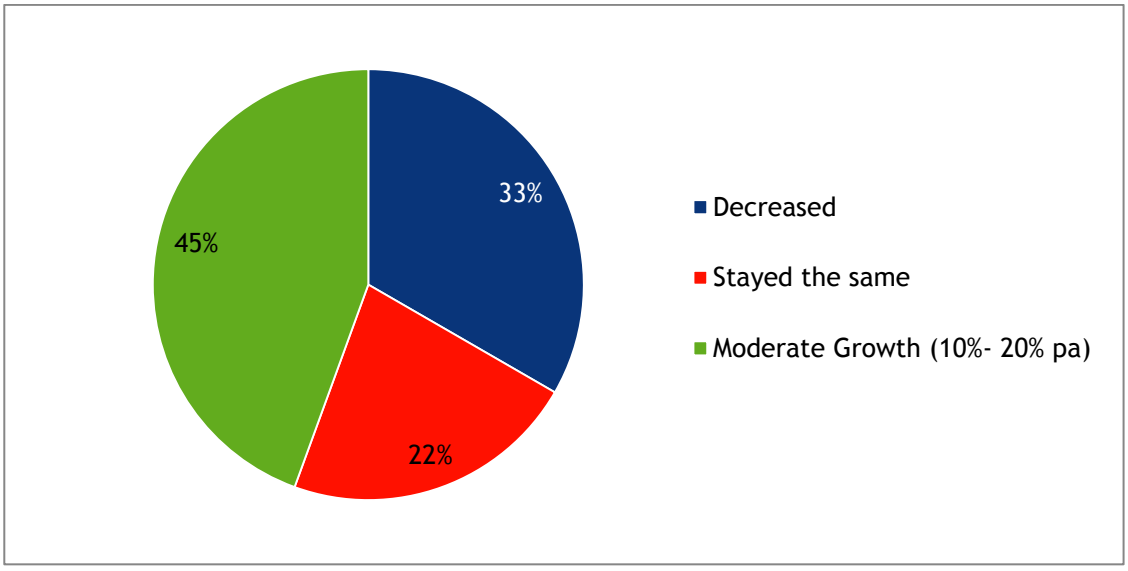
This section details the findings of the nine companies interviewed from the Marine Tourism sector. There was a total of 83 employees within the companies interviewed representing approximately 2.4% of the total employment 3,502 employees in the marine tourism sector in Ireland.

It is important to note that all the statistics in this section refer only to the companies interviewed and therefore cannot be extrapolated to the entire sector.

5.2.1 Turnover and Exports

Figure 5.1 shows that of the nine companies interviewed in the Marine Tourism sector, four companies (45%) stated that turnover had grown moderately (increased by approx. 10%-20% per annum) over the last three years while three companies (33%) stated turnover had decreased and two companies (22%) indicated turnover had stayed the same.

Figure 5.1: Percentage of Companies that experienced a Change in Turnover over the last 3 Years in the Marine Tourism sector

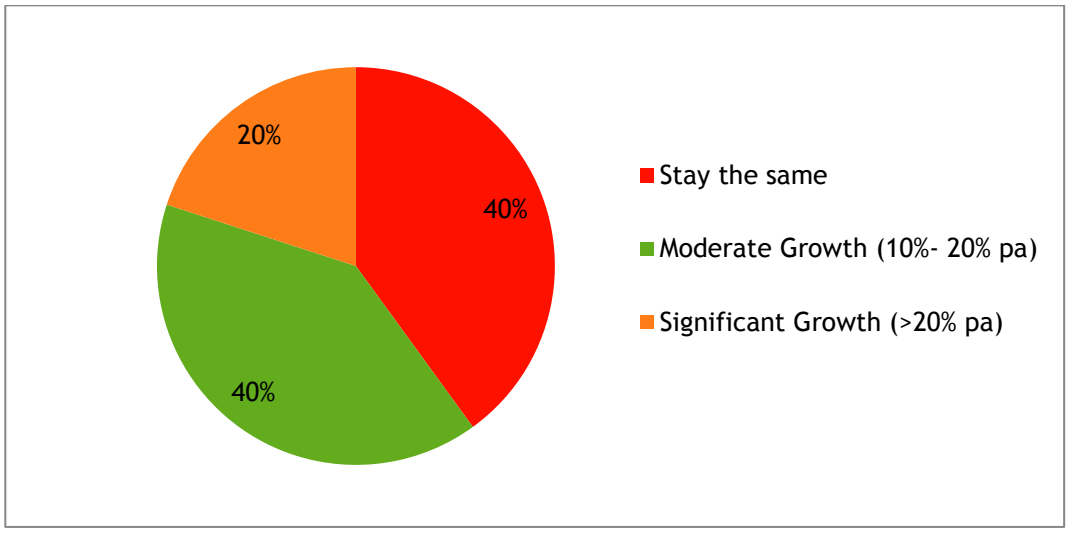


Source: Company interviews – RSM McClure Watters, 2014

[129] Key Skills for Enterprise to Trade Internationally. EGFSN 2012. http://www.skillsireland.ie/publications/2012/title,9402,en.php

The interviews with companies also found that of the nine companies interviewed five stated that a percentage of their turnover was from foreign tourists. Figure 5.2 below shows the levels of foreign tourist growth anticipated over the next six years by those five companies. Two of the companies (40%) expected numbers of foreign tourists to grow moderately (increase by approx. 10%-20% per annum) while a further two expected them to stay the same over the next 6 years.

Figure 5.2: Anticipated Foreign Tourist Growth over the next 6 Years



Source: Company interviews – RSM McClure Watters, 2014

5.2.2 Employment Growth / Decline by Occupation

Companies were asked about their employment growth by occupation over the last three years and their anticipated growth for the next six years. Examples of job roles by occupation within the Maritime Tourism Sector are outlined in Table 5.3.

Table 5.3: Job Roles by occupational level in the Marine Tourism Sector

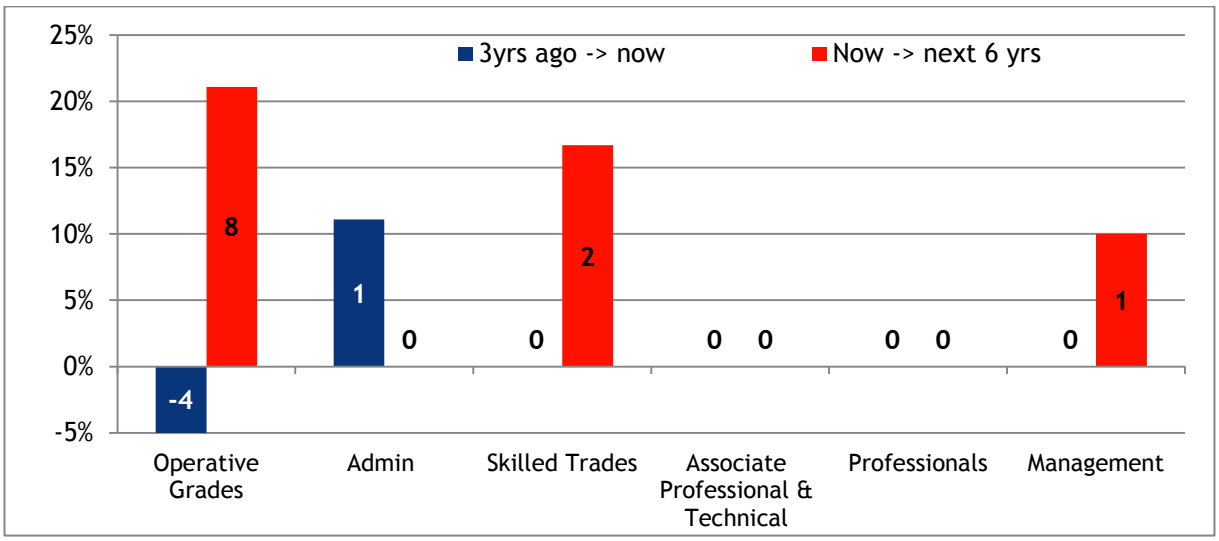
Occupation Level	Detailed occupation
Operative Grades	Bar Staff, Waiting staff, Cleaners, Drivers, Retailers, General Operatives
Administration	HR staff, General Administrators, Receptionists
Skilled Trades	Sailing and Wind Surfing Instructors, Canoeing/Sea Kayaking Instructors, Angling Instructors, Adventure Sports Instructors, Life Guards, Boat Builders, Tour Operators/Guides, Maintenance Technicians, Marine Engine Maintenance, Electricians, Chefs
Associate Professional & Technical	Engineering Technicians and IT Technicians
Professionals	Marketing and Public Relations Staff, Translators, Environmental Managers
Management	Managers - Adventure Centres and Marine Parks, Hotel and Catering Managers

Source: Our Ocean Wealth – Background Briefing Document, Part III, Enablers - Getting the Conditions Right for Growth (2012)

Figure 5.3 shows that there has been little or no employment growth over the last three years in the Marine Tourism Companies interviewed. Employment declined for operatives and with the exception of Administration which increased by 11% (1 person) all other occupations stayed the same.

Over the next 6 years, the companies anticipated a slight employment growth in the Operative Grades and Skilled Trade occupations with growth rates of 21% (8 persons) and 17% (2 persons) respectively. Particular caution must be exercised when drawing conclusions from these results due to the small sample base of only 2.4% (83 employees).

Figure 5.3: Employment Growth/ Decline within Marine Tourism Sector*



Source: Company interviews – RSM McClure Watters, 2014

*Please note values are calculated as a percentage of growth from 3 years ago to now and now to the next 6 years, within specific occupations. The numbers stated in the above figure represent the number of employees companies have stated they have gained from 3 years ago to now and will need from now to the next 6 years.

5.2.3 Current and Required Skills Levels

Companies interviewed were asked about the current and future qualifications under the National Framework of Qualifications (NFQ) that they would require for the different occupations. (Table 5.4) The NFQ is detailed in Appendix 4.

The number of current employees in the companies interviewed is very small for some occupations, and therefore no clear conclusions can be drawn from these. The exception is for operative grades and from this it is projected that the profile of qualifications needed for operatives will remain the same as at present.

Table 5.4: Current and anticipated NFQ Levels required by Occupation in Marine Tourism

Occupation			NFQ Level									
	Number		<4		4-5		6-7		8		9-10	
	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future
Operative Grades	38	46	3%	2%	79%	78%	0%	0%	18%	20%	0%	0%
Administration	10	10	0%	0%	**70%**	**80%**	**20%**	**10%**	10%	10%	0%	0%
Skilled Trades	12	14	0%	0%	17%	14%	75%	79%	8%	7%	0%	0%
Associate Professional & Technical	6	6	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%
Professionals	7	7	0%	0%	**0%**	**14%**	71%	57%	29%	29%	0%	0%
Management	10	11	0%	0%	50%	50%	**10%**	**0%**	30%	30%	**10%**	**20%**
Total	**83**	**94**										

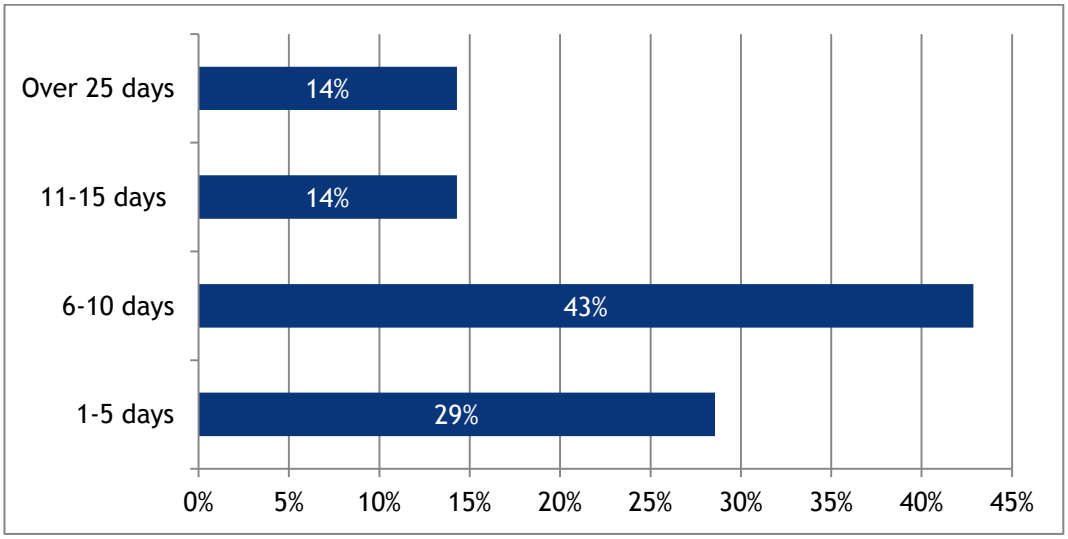
Source: Company interviews – RSM McClure Watters, 2014

Cells shaded indicate no significant change in NFQ level required for the occupation, while cells shaded indicate a higher NFQ level required and cells shaded indicate a corresponding decline in NFQ required

5.2.4 Training and Development

Companies were asked about their training provision for their employees. Figure 5.4 shows that for the Marine Tourism sector 43% of the companies interviewed provided between 6-10 training days a year per employee and 29% trained staff 1-5 days per year

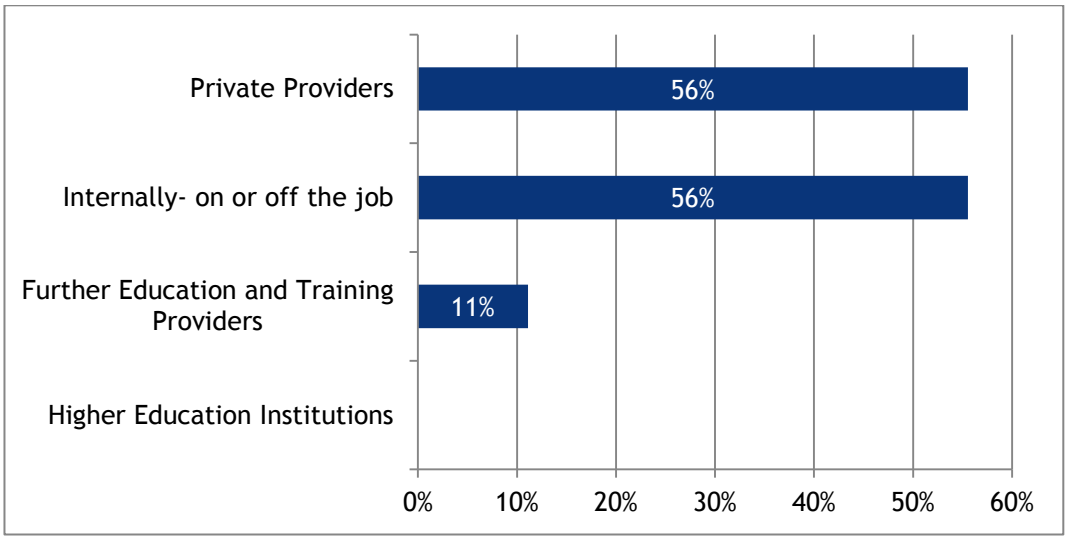
Figure 5.4: Number of Training Days in the Marine Tourism sector



Source: Company interviews – RSM McClure Watters, 2014

Figure 5.5 shows that 56% of companies used Private Providers and/or conducted in-house training

Figure 5.5: How Training was delivered in the Marine Tourism sector



Source: Company interviews – RSM McClure Watters, 2014

5.2.5 Availability of Personnel

Companies were asked about the availability of personnel with the relevant education, skills and expertise. A summary of the results in outlined in Table 5.5; however caution must be used in interpreting these results given the low response rate.

Table 5.5: Availability of Personnel for the Marine Tourism sector

	Not enough people in my local area with right level of:					
	Education		Experience		Skills	
	N	%	N	%	N	%
Operative Grades	4	44%	3	33%	3	33%
Administration	1	11%	1	11%	1	11%
Skilled Trades	0	0%	0	0%	0	0%
Associate Professionals and Technical	2	22%	2	22%	2	22%
Professionals	1	11%	1	11%	0	0%
Management	0	0%	0	0%	0	0%
Base= 9						

Source: Company interviews – RSM McClure Watters, 2014

Table 5.5, indicates that companies have the most difficulty finding operatives (pink shaded cells). As many of these jobs are in coastal communities, areas which are experiencing high unemployment, this figure is probably a reflection of the seasonal nature of the sector as opposed to unavailability of personnel. This is also supported by the findings in the EGFSN *National Skills Bulletin* which indicate "No skills Shortage" but has retention issues.

5.2.6 Difficulties Filling Current Vacancies and Skills Supply

In total 67% of companies interviewed in the Marine Tourism sector stated that they didn't have a problem sourcing specific skills and qualifications. Of the remaining 33%, the main skills and qualifications difficult to source were identified as people with practical experience and knowledge of working in a marine environment (i.e. boat skippers or boat men, and kayak/ rock-climbing skills/qualifications). Companies interviewed found it difficult to recruit mariners, part time outdoor tutors and boat mechanics.

5.3 Stakeholder Consultation and Analysis

Cruise Tourism is an area that has been identified as having potential for large growth in visitor numbers, with the associated increase in visitor expenditure which would in turn give rise to increased employment. Increased tourism numbers from cruise passengers would be expected to relate mostly to increased employment in the tourism services and attractions sector, which comprises golf courses, equestrian centres, visitor attractions, car hire, coach hire, cruising and water based activity centres.

For water based activities, the Irish Sailing Association (ISA) provides training and accreditation for sailing schools, power boating and wind surfing, and there are approximately 140 training centres in Ireland split between commercial training centres and sports clubs. Approximately 3,000 instructors are accredited and trained by ISA. Commercial centres average 5-10 FTE and additional seasonal employment during summer, mostly employing students. Employees are generally sailing enthusiasts and entrepreneurial, with several starting up their own training business when experienced.

Ocean racing offers a good career path into professional sport but currently there is little opportunity in Ireland for Irish Olympic level sailors, so they leave to work overseas. However, with the unique Atlantic facing coastal areas combined with Ireland's talented pool of professional sailors, Ireland is an ideal location for an "Ocean Racing Training Base" such as the successful development in Lorient, France, where there are 1,300 jobs in the local nautical industry cluster and over 700,000 annual visitors for festivals. In addition to the impact on tourism numbers, the establishment of a yacht racing hub to attract "international racing teams" to Ireland, would increase requirements for sail making, IT, boat building and associated supply chains. These businesses would need graduates with good technical knowledge of sailing. It can be difficult to attract school leavers to a career associated with sailing in Ireland as it is not recognised as a career here but is seen more as hobby.

5.4 Future Demand for Marine Tourism Skills, 2015-2020

5.4.1 Introduction

This section of the report deals with the future demand for skills in the Marine Tourism sector over the period 2015-2020, arising from growth of the sector and replacement of arising from exits to inactivity and net losses from inter-occupational movements, referred to as expansion and replacement demand respectively.

Scenario 1 assumes that the turnover targets set out in Harnessing Our Ocean Wealth of increasing turnover to €1.5bn will to be met by 2020. Taking these targets and translating them into number of jobs the demand for skills out to 2020 for those jobs is forecast. Consultations with stakeholders, informed by the economic background data gathered, were used to determine how this increase in turnover could be achieved, how the additional turnover would be distributed between the various industries making up the Marine Tourism subsector, and how employment would need to increase in order to generate this turnover. A modelling exercise was then conducted using the information from the company interviews to estimate how the expansion demand would be distributed by occupational grade in each sub-sector over the period 2015-2020.

An estimation of the replacement demand was also conducted using data provided by the SLMRU (Skills and Labour Market Research Unit, SOLAS) and following the methodology used by them in the publication of the EGFSN *National Skills Bulletin*[130] on the exits from employment to economic inactivity and net losses from inter-occupational movements, which vary by occupation.

5.4.2 Scenario 1: Achieving the HOOW targets

5.4.2.1 Summary and Assumptions: Scenario 1

The marine tourism scenario is based on achieving the HOOW turnover target of €1,500 million by 2020. The collected view of the stakeholders was that this was achievable. Based upon the average turnover per capita observed in marine tourism and leisure between 2007 and 2010, this would require an increase in employment to around 6,949 by 2020. This is a substantial increase over the current level of employment, but the equivalent figure of 5,836 from 2007 (and the seasonal and rapid-hiring nature of the sector) suggests that this is not beyond the capacity of Ireland's tourist economy to support.

5.4.3 Employment and Skills Implications

The distribution of expansion demand of 3,447 additional FTE jobs by occupation level is shown in Table 5.6 and was developed using the distribution of employment by occupation in established by Fáilte Ireland. The first column shows the 2014 FTE baseline estimate by occupation level. The next set of columns presents the expansion demand, the percentage of that figure to the 2014 baseline estimate for that occupation level and the percentage of the occupation expansion to the total expansion demand. Then follows the replacement demand - those leaving, e.g. due to retirement or change of occupation. The gross demand is the sum of the expansion and replacement demand and is the true reflection of the skills demand for the sector. Summed across the period 2015-2020, the

[130] http://www.skillsireland.ie/media/23072014-National_Skills_Bulletin%20_2014--Publication.pdf

total number of workers leaving is estimated to be 1,752 FTEs, known as the replacement demand, which when summed with the expansion demand gives a gross demand of 5,199 FTE employees.

Table 5.6: Distribution of Expansion and Replacement Demand by occupation level for Scenario 1 for Marine Tourism and Leisure including cruise tourism

Occupation Level	2014 Baseline Estimate	% 2014 Total Baseline Estimate	Expansion Demand 2014-2020		% of Expansion demand	Replacement Demand 2014-2020		% of Replacement demand	Gross Demand		% of Gross demand
			No.	% of 2014		No.	% of 2014		No.	% of 2014	
Operatives	1,604	46%	1,705	106%	49%	1,100	69%	63%	2,805	175%	54%
Administrative	422	12%	371	88%	11%	164	39%	9%	535	127%	10%
Skilled Trades	506	14%	519	103%	15%	265	52%	15%	784	155%	15%
Associate Profess-ionals & Technical	253	7%	222	88%	6%	57	23%	3%	279	110%	5%
Professionals	295	8%	259	88%	8%	74	25%	4%	333	113%	6%
Managers	422	12%	371	88%	11%	92	22%	5%	463	110%	9%
Total	**3,502**		**3,447**	**98%**		**1,752**	**50%**		**5,199**	**148%**	

Source: PACEC, 2014

Operatives comprise 46% of the total employment in marine tourism and they are also the occupation with the largest expansion demand of 49%. For replacement demand, in keeping with the expected pattern for replacement by occupation, the operatives replacement is 63% of the total replacement demand while managers and professionals is 5% and 4% respectively yet their proportion within the 2014 employment estimate is 12% and 8% respectively.

The gross demand over the period to 2020 is the sum of the expansion and replacement demand and is 5,199 FTEs which is greater than the current total employment.

The distribution of expansion demand of 3,447 additional FTE jobs by educational attainment is shown in Table 5.7. The demand is concentrated in levels 4 - 5 of the framework (Secondary school leaving certificate) driven by the predominance of operative grade occupations.

Table 5.7: Distribution of Expansion demand by Educational Attainment for the Marine Tourism sector

NFQ Level	Description	Expansion Demand
<4	Junior Certificate or below	34
4 - 5	Secondary School Leaving Certificate	1,884
6 - 7	Higher Certificate / Advanced Certificate or Bachelors Degree	854
8	Honours Degree or Higher Diploma	601
9 - 10	Masters Degree / Postgraduate Diploma or Doctoral Degree	74
Net Total		3,447

Source: Company interviews – RSM McClure Watters, 2014

5.5 Supply Side Information

As with all of the other sectors, the education and training for Marine Tourism identified here focusses on the "aquatic" aspect of the sector. There are many routes into Marine Tourism such as Tourism; Business; Hospitality and Catering; and Hotel management courses. For the cruise industry, likewise there are many aspects to the industry. For those working on the ships there are two kinds of training needed: (i) the managing/sailing of the ship itself which requires a maritime qualification such as the Nautical Science or Marine Engineering degrees provided by NMCI and detailed in section 3.5.1 and (ii) the services provided on the ship which require people trained in hospitality.

The tourism products required on shore when a liner arrives at a destination are the normal tourism activities such as bars, catering and guiding. For the purposes of this study the focus has been on the water based tourism, such as angling, sailing, surfing and adventure centres with a focus on water sports.

5.5.1 Outdoor Adventure Activity Tourism

Adventure/Outdoor Activity Tourism has become one of the fastest growing sectors of the tourism industry. Table 5.8 lists most of the outdoor adventure activity training courses available in Ireland.

Table 5.8: Outdoor Adventure Activity Training Courses

Course Title	Provider	Course type	Award	Duration
Outdoor Education and Leisure	GMIT	BA ord/ hons	NFQ Level 7/ 8	3 yrs/ 1 yr add-on
Adventure Tourism Management	IoT Tralee	BA ord/ hons	NFQ Level 7/ 8	3 yrs/ 1 yr add-on
Outdoor Adventure Management (Colloquially referred to as the Shackelton Course)	Colaiste Dhulaigh College of Further Education	PLC	NFQ Level 5	3 yrs
Outdoor Adventure Education	Kinsale College of Further Education	PLC	NFQ Level 5 and 6	1 yr + 1 yr
Outdoor Sport and Recreation	Bray Institute of Further Education (FE)	PLC	NFQ Level 5	1yr
Outdoor Sport and Recreation	Drogheda Inst. of FE	PLC	NFQ Level 5	1yr
Outdoor Sport and Recreation	Lough Allen College	PLC	NFQ Level 5	1yr
Outdoor Recreation	St. Kevin's College Crumlin	PLC	NFQ Level 5	1 yr

Course Title	Provider	Course type	Award	Duration
Outdoor Activity Instructor Traineeship	Donegal ETB, Gweedore	SOLAS (FÁS) Training		1 yr
Outdoor Recreation	Achill Outdoor Education Centre (OEC)	PLC	NFQ Level 5	1 yr
Outdoor Activity Instructor Traineeship	Cappanalea OEC	PLC	NFQ Level 5	1 yr
Surf Instructor and Beach Lifeguard Training	SOLAS ETB Training in Tralee, Bundoran, Sligo, Westport, Skerries and Ennis, Nov 2014 – Jul 2015			26 weeks

Source: List compiled by EGFSN-DJEI, Nov 2014

On the three year programmes the students obtain a range of awards from the relevant National Governing Body for a given adventure sport such as, hill walking, rock climbing, sailing, canoeing and windsurfing. In addition, students learn about the adventure tourism industry, entrepreneurship and business management, the developmental and educational role of outdoor education, child protection and communication and personal leadership. Graduates from these courses find employment as instructors and managers in adventure and outdoor education centres or establish their own activity centre.

The "Shackleton" course in Coláiste Dhulaigh is one of the longest established outdoor activity training courses having started in the 1970's. Graduates from this course are often employed by earlier graduates. Graduates from Coláiste Dhulaigh can also continue their studies with advanced entry to the GMIT and Tralee IoT courses as listed in Table 5.8 and also to Waterford IoT (Leisure Management), University of Chicester (Outdoor education), Strathclyde University (Outdoor Education) and University of St. Martins (Outdoor Education).

5.5.2 Watersports Training and Certification

National Governing Bodies for watersports regulate the training, awards and qualifications. The organisations relevant to this study are:

- The Irish Sailing Association - ISA
- The Irish Canoe Union (now known as Canoeing Ireland) – ICU
- The Irish Surfing Association

The Irish Sailing Association is the National Governing Body for sailing and motor-boating in Ireland. It develops and administers a range of training to support all those involved in sailing and boating of all types. ISA certified training courses can only be run at accredited ISA training centres, by suitably-qualified staff, who follow the relevant national syllabus, use appropriate well-maintained equipment and have adequate safety support. A list of all of the ISA course are in Table 5.9.

The Irish Canoe Union (Canoeing Ireland) is the recognised National Governing Body for canoeing and kayaking in Ireland. Like the ISA it has awards and qualifications to different levels for river and

sea kayaking and canoeing. The Levels for instructors run from 1 – 4 and determine up to which skill level an instructor can teach.

The Irish Surfing Association is the National Governing Body for the sport in the 32 counties of Ireland. It is a voluntary organisation comprising clubs involved in the development, representation and regulation of surfing in Ireland.

The students on the adventure tourism courses receive their instructor qualifications from these governing bodies.

Table 5.9: Watersport Training Courses

Course Title	Provider	Course type	Award	Duration
ISA Instructor Qualification Courses: ▪ Dinghies, ▪ Keelboats, ▪ Catamarans, ▪ Sailing Yachts, ▪ Motor Yachts, ▪ Powerboats, ▪ Windsurfing.	Irish Sailing Association – ISA approved training centres	Courses to various Instructor levels allowing for instruction to different Skills levels		
ICU Instructor Qualification Courses: ▪ Kayaking: Level 1 - 4 ▪ Sea Kayaking: Level 3 - 4 ▪ Canoeing: Level 1 – 4 ▪ Level 5 Instructor – recognises a level of excellence in coaching techniques	ICU – Irish Canoe Union	Courses to various Instructor levels allowing for instruction to different Skills levels		
Level 1 Surf Instructor Course	Irish Surfing Association			
ISA Shorebased training: ▪ Navigation, ▪ Emergency Care, ▪ Sea Survival	ISA approved training centres			
Yachtmaster - Offshore and Ocean Certificate	ISA training centres			

Source: List compiled by EGFSN-DJEI, Nov 2014

A number of other courses were identified that are of relevance to the Marine Tourism/Marine Leisure industry and also the aquaculture sector. They are identified in Table 5.10.

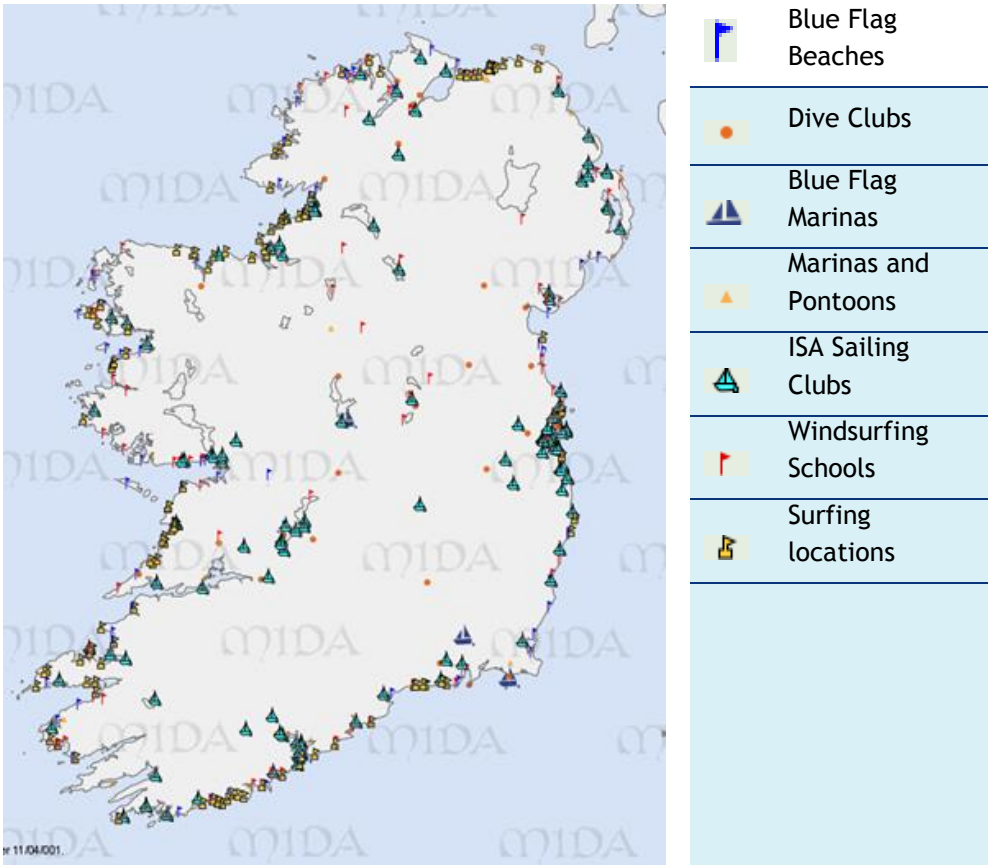
Table 5.10: Boat and Engine Training Courses

Course Title	Provider	Course type	Award	Duration
ISA Shorebased training: Marine Engine	ISA approved Centres			
Marine Engine Maintenance	Cabinteely Community School and Ringsend College	Lifelong Learning		1 evening/wk x 10 wks
Boat Building	Cavan Institute	PLC	QQI	1 yr
Boat Building	Ionad Oiliuna agus Oideachais Rosmuc	BTEI	QQI	Evenings
Boat Building	Garmscoil Einne	Lifelong Learning		8 weeks, 2 hrs/ evening

Source: List compiled by EGFSN-DJEI, Nov 2014

The map below which shows the locations of many water based leisure activities has been generated from the interactive Marine Irish Digital Atlas (MIDA)[131].

Figure 5.6: Water Based Leisure Activities



Source: The Marine Irish Digital Atlas (MIDA)

[131] http://mida.ucc.ie/contents.htm

5.5.3 Marine and Countryside Guiding

Marine and Countryside Guiding (MCSG), a Regional and Local Guiding, Special Purpose Level 6 Award, was designed by Fáilte Ireland and the National Tourism Development Authority in consultation with discipline specialists and providers. The programme equips participants with the professional, technical, social and administrative skills to offer a quality guiding service. The programme has been offered by Letterkenny IT (LYIT), GMIT, Tralee IT and Galway-Roscommon ETB. Currently there are about 60 people between LYIT, Tralee It and Galway-Roscommon ETB taking the MCSG programme.

It usually consists of two modules, namely "Guiding" and "Irish Cultural and Natural Heritage". Additional modules on Coarse, Game, Pike and Boat Angling Guiding and Shore Guiding have also been offered but these tend to be more expensive and Fáilte Ireland no longer part-funds these programmes.

Many of the providers of the MCSG course who are located on the Wild Atlantic Way route are exploring the possibility of establishing a Wild Atlantic Way Ambassador Programme.

5.6 Summary

Employment in Marine Tourism 2010 was estimated to be 3,520 FTEs (FTE), and turnover was €841 million. Harnessing Our Ocean Wealth has set a turnover target of €1.5 billion for the Marine tourism sector by 2020.

In Scenario 1 - achieving the HOOW targets by 2020, the marine tourism will create 3,447 new jobs. Replacement demand would require a further 1,752 FTEs giving rise to a total gross demand of 5,199 FTEs largely concentrated among operative grades (2,805 FTEs).

Cruise Tourism has potential to grow its visitor numbers, with the associated increase in visitor expenditure and give rise to increased employment in the tourism services and attractions sector, such as golf courses, equestrian centres, visitor attractions, car hire, coach hire, and water based activity centres.

There are many qualifications offering routes into Marine Tourism such as Tourism, Business, Hospitality and Catering, and Hotel management courses. There are also specific training courses available in outdoor adventure activity tourism, watersports training and certification, boats and engine training and marine and countryside guiding.

Ireland produces Olympic level sailors, and ocean yacht racing offers a good career path into professional sport. Currently, however, there is little opportunity for Irish Olympic level sailors in Ireland but this local talent pool combined with Ireland's unique Atlantic facing coastal areas, positions Ireland as an ideal location for an "Ocean Racing Training Base" such as that in Lorient in France which has created 1,300 jobs in its local nautical industry cluster and over 700,000 annual visitors for festivals.

Chapter 6: Maritime Monitoring, Security and Surveillance

Sub-sector
▪ **High-tech marine products and services**

6.1 Economic Profile

The 2010 economic indicators for the Maritime Monitoring, Security and Surveillance sector are summarised in the Table 6.1 below:

Table 6.1: 2010 Economic Indicators for the Maritime Monitoring, Security and Surveillance Sector

Sub-sector	Direct Employment (FTE)	GVA (€millions)	Turnover (€millions)
High-tech marine products and services	391	21	56

Source: SEMRU, Ocean Economy Report 2013 (Ref. year 2010)

The most recent official data is the 2010 data provided by SEMRU (Socio-Economic Marine Research Unit in NUIG). The first Ocean Economy Report, published in 2010, was based on the reference year 2007, at the height of the economic boom (2003 – 2007). The latest report, with a reference year of 2010 and published in December 2013, represents the lowest point of the economic contraction (2007 – 2010) and a significant decrease in activity. In order to develop forecasts of the future skills demand to 2020, baseline estimates for 2014 were produced[132], using additional sources of information, such as: annual CSO (Central Statistics Office) employment trend data for broad sectors; Economic and Social Research Institute (ESRI) Medium Term Review (MTR) 2013 – 2020 and SOLAS Occupational Employment Projection 2020 (Jan 2014); results from company surveys; and discussions with stakeholders.

The 2010 figures indicate that turnover and exports had increased steadily from 2007 and indications suggest that this trend has continued. In 2007, turnover was €43.6m and increased to €56m in 2010 (growth of 28.2%). Likewise, exports increased from €10.8m in 2007 to €12.3m in 2010. The numbers in direct full time employment while low compared to other marine industries increased also from 350 FTEs in 2007, to 391 in 2010. The consensus position is that the sector continued to grow in employment between 2010 and 2014 at its trend rate of around 4% a year and a baseline of 457 FTE employees in 2014 has therefore been estimated.

Table 6.2: Monitoring, Security and Surveillance– FTE Direct Employment 2007, 2010, 2014 (estimated)

Sub-sector	2007‡	2010‡	2014*
High-tech marine products and services	350	391	457

‡: SEMRU Data from "*Ireland's Ocean Economy*", Ref Year 2007, (2010) and Ref year 2010 (2013)

*: 2014 baseline estimates, developed by PACEC, based on the 2010 SEMRU data

[132] The 2014 employment estimates were based on the SEMRU 2010 data which was the latest available data at the time. SEMRU are currently updating the 2010 data and will publish the 2012 figures later in 2015. The SEMRU publication will also present 2014 estimates but based on 2012 data.

The high-tech marine products and services sector encompasses companies from across both the ICT and marine sectors. It is an emerging sector of strategic interest to multinational ICT companies in Ireland many of whom are engaged in the development and provision of high-tech marine products and services to the global marine market. Technology convergence and integration are essential to the development of specialist marine ICT tools which include the provision of remote sensing systems, data management and visualisation tools, modelling, simulation, forecasting and engineering design supporting operational management.

The marine economy faces technology challenges such as the deployment of sensor networks, the development of software and control interfaces and access to communication links for data transfer and management. The application of remote sensing and information technologies for environmental measurement and monitoring presents Ireland with an opportunity to capitalise on the rapid evolution of technology in this area.

With Ireland's ocean territory ten times the size of its land mass and its strategic position on the western periphery of Europe makes Ireland an ideal location for a European and Global Centre for ocean research, technology and innovation. In 2010, the Marine Institute published a National Strategy on the development of the Smart Ocean Innovation Cluster[133] which involved the creation of a multi-disciplinary innovation cluster supporting the convergence of ICT and marine related industries. SmartBay Ireland[134], which manages the ¼ scale marine test site located in Galway Bay, is the national marine test facility for the development of innovative products and services for the global maritime sector. This includes the trial and validation of novel marine sensors, prototype equipment and the collection and dissemination of marine data to national and international users of the facility.

HOOW identifies this sector as one with opportunities for economic growth and has set a turnover target in excess of €61 million by 2020. There are currently in the region of 50 indigenous and multinational companies in the Maritime Monitoring, Security and Surveillance sector based in Ireland.

6.1.1 Skills

If Ireland is to build a successful Marine ICT sector it has to meet the global market requirements, which will be the capacity to quickly train marine ICT technicians (Levels 6 & 7) in addition to ICT graduates (Levels 8, 9 and 10).

The EGFSN Report, *Addressing Future Demand for High-Level ICT Skills*[135] forecasts the demand for high-level ICT skills over the period 2013-2018. Technological trends are changing rapidly as are the demand for new skills associated with these new technologies. Particular areas of demand include cloud computing, mobile devices and technology, Big Data analytics, IT security, social technologies, micro and nano-electronics. This demand also applies across the marine economy.

[133] http://www.smartocean.org/Home.aspx
[134] http://www.smartbay.ie/Home.aspx
[135] http://www.skillsireland.ie/publication/egfsnSearch.jsp?ft=/publications/2013/title,11287,en.php.

6.2 Company Interviews

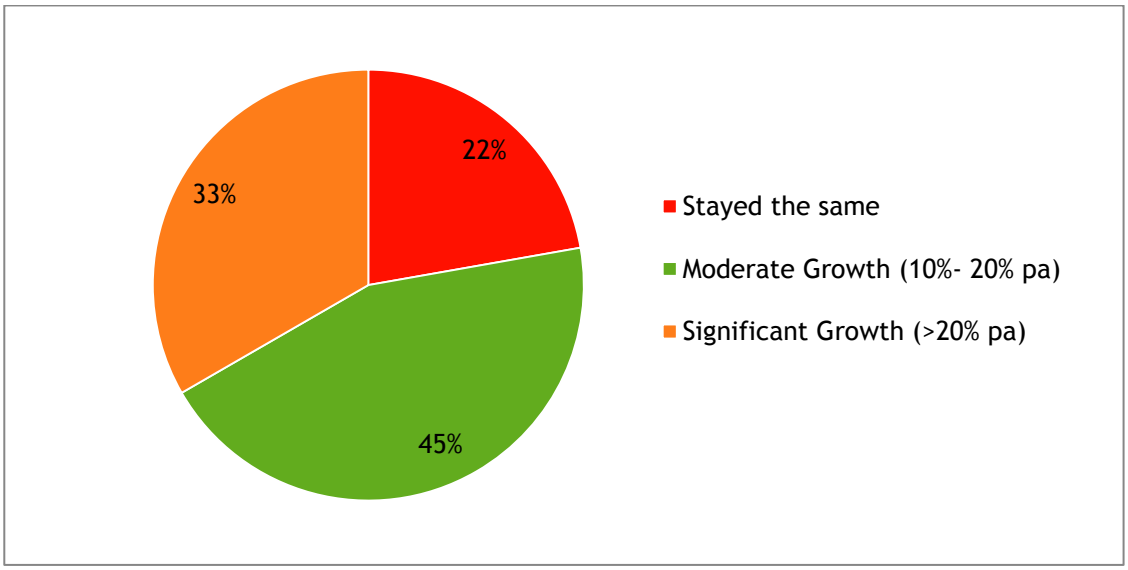
This section details the findings of the nine companies interviewed from the Maritime Monitoring, Security and Surveillance Sector. There was a total of 124 employees within the companies interviewed representing approximately 32% of the total employment of 391 FTEs in the Maritime Monitoring, Security and Surveillance sector in Ireland.

It is important to note that all the statistics in this section refer only to the companies interviewed and therefore cannot be extrapolated to the entire sector.

6.2.1 Turnover and Exports

Figure 6.1 shows that of the nine companies interviewed in the Maritime Monitoring, Security and Surveillance sector, four companies (45%) stated turnover had grown moderately (increased by approx. 10%-20% per annum) over the last three years while three (33%) stated turnover had grown significantly and a further two (22%) said that turnover had stayed the same.

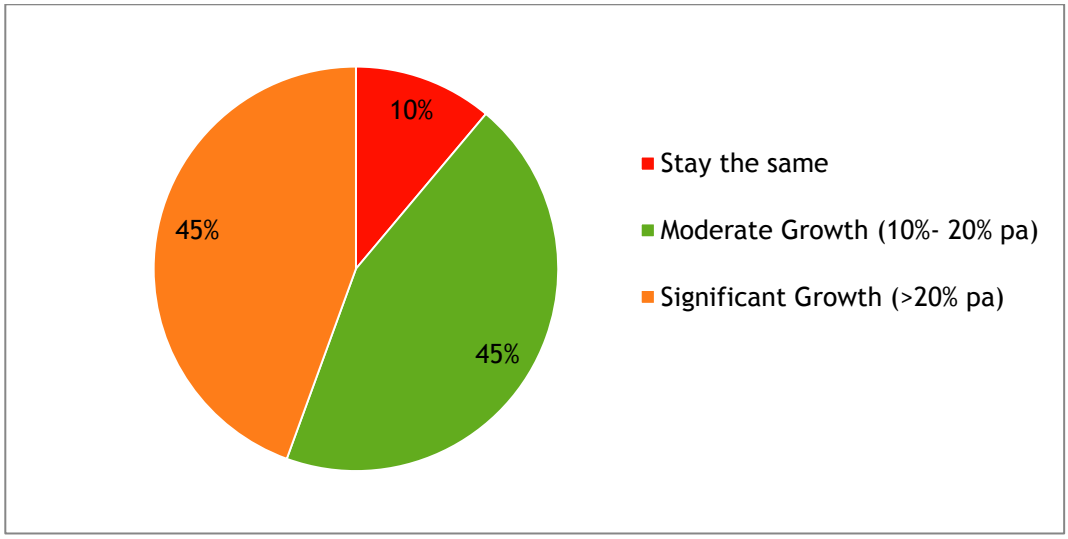
Figure 6.1: Percentage of Companies that experienced a Change in Turnover over the last 3 Years in the Maritime Monitoring, Security and Surveillance Sector



Source: Company interviews – RSM McClure Watters, 2014

Figure 6.2 shows the levels of export growth anticipated over the next six years by the companies interviewed. Four companies (45% of those interviewed) expected levels of exports to grow moderately (increase by approx. 10%-20% per annum) and a further four expected levels to grow significantly (increase by more than 20% per annum) over the next six years.

Figure 6.2: Anticipated Export Growth over the next 6 Years in the Maritime Monitoring, Security and Surveillance Sector



Source: Company interviews – RSM McClure Watters, 2014

6.2.2 Employment Growth / Decline by Occupation

Companies were asked about their employment growth by occupation over the last three years and their anticipated growth for the next six years. Examples of job roles by occupation within the Maritime Monitoring Sector are outlined in Table 6.3 below.

Table 6.3: Job Roles by occupational level in the Maritime Monitoring, Security and Surveillance Sector

Occupation Level	Job Roles
Operative Grades	General Operatives
Administration	HR staff, General Administrators, Receptionists
Skilled Trades	Mechanics, Electricians, Maintenance Technicians, Divers
Associate Professional & Technical	Web Developers, Programmer/Software Developers, Technical Sales Staff
Professionals	Network Engineers, Telecoms Engineers, Software Engineers, Electronic Engineers, Civil / Structural Engineers, Systems Analysts, Data Analysts, Geoscientists, Oceanographers, Marketing Managers
Management	Entrepreneurs, CEOs, Project Managers

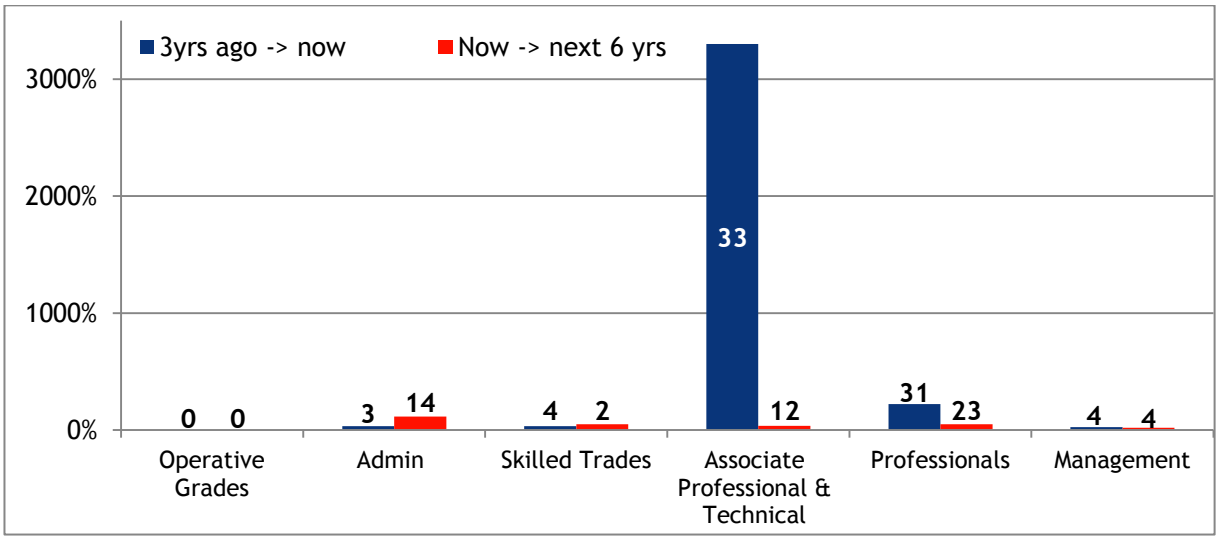
Source: Our Ocean Wealth – Background Briefing Document, Part III, Enablers - Getting the Conditions Right for Growth (2012)

Figure 6.3 shows the employment growth and the anticipated employment growth of the interviewed companies.

Over the previous three years these companies have seen their greatest expansion in the Associate Professional and Technical occupations with 33 new jobs created from a base of one three years ago. Professional occupations also saw employment growth with 31 new jobs amounting to 220%

increase in professional employment. Over the next six years, companies anticipated the largest percentage employment growth in Administration occupations with a growth of 117% (14 jobs). Modest growth was also projected for Professional (23 jobs) and Skilled Trade occupations (2 jobs) over the next six years at 51% and 50% respectively. Again, caution must be exercised when drawing conclusions from these figures due to the small sample base.

Figure 6.3: Employment Growth within Maritime Monitoring, Security and Surveillance Sector*



Source: Company interviews – RSM McClure Watters, 2014

*Please note values are calculated as a percentage of growth from 3 years ago to now and now to the next 6 years, within specific occupations. The numbers stated in the above figure represent the number of employees companies have stated they have gained from 3 years ago to now and will need from now to the next 6 years.

6.2.3 Current and Required Skills Levels

Companies interviewed were asked about the current and future qualifications under the National Framework of Qualifications (NFQ) that they would require for the different occupations. (Table 6.4) The NFQ is detailed in Appendix 4.

The outcome from the Maritime Monitoring, Security and Surveillance companies interviewed was that no major change in qualifications would occur for any of the occupations. Operatives and skilled trades would remain unchanged at Levels 4 – 5 and Levels 6 – 7 respectively. For administrative roles Level s 6 – 7 remains the principal level of educational attainment and an increase for Level 8 with the attendant decrease in Levels 9 – 10. This reduction in the numbers with Level 9 – 10 qualifications in Administrative roles indicates that these individuals are expected to find occupations more commensurate with their qualification. The associate professional and technical occupations are expected to see an increase at numbers with levels 6 and 7 with a corresponding reduction for Levels 8, 9 and 10 for reasons similar to those for the administrative occupations. For professionals not surprisingly the qualification levels required will increase from Level 8 to Level 9 – 10 which is in keeping with the skills required in such an emerging sector, namely advanced qualifications and research skills. It is important to note in some cases the number of current employees is very small and therefore the results may not be representative of the sector, however the results do indicate what might be expected from such a sector at a time emerging from an economic recession and high unemployment.

Table 6.4: Current and anticipated NFQ Levels required by Occupation in Monitoring, Security and Surveillance

Occupation			NFQ Level									
	Number		<4		4-5		6-7		8		9-10	
	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future	Current	Future
Operative Grades	9	9	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%
Administration	12	26	0%	0%	0%	0%	58%	57%	**9%**	**27%**	**33%**	**16%**
Skilled Trades	4	6	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%
Associate Professional & Technical	34	46	0%	0%	0%	0%	**3%**	**10%**	44%	41%	53%	49%
Professionals	45	68	0%	0%	0%	0%	1%	0%	**79%**	**65%**	**20%**	**35%**
Management	20	24	0%	0%	5%	3%	0%	0%	55%	54%	40%	43%
Total	**124**	**179**										

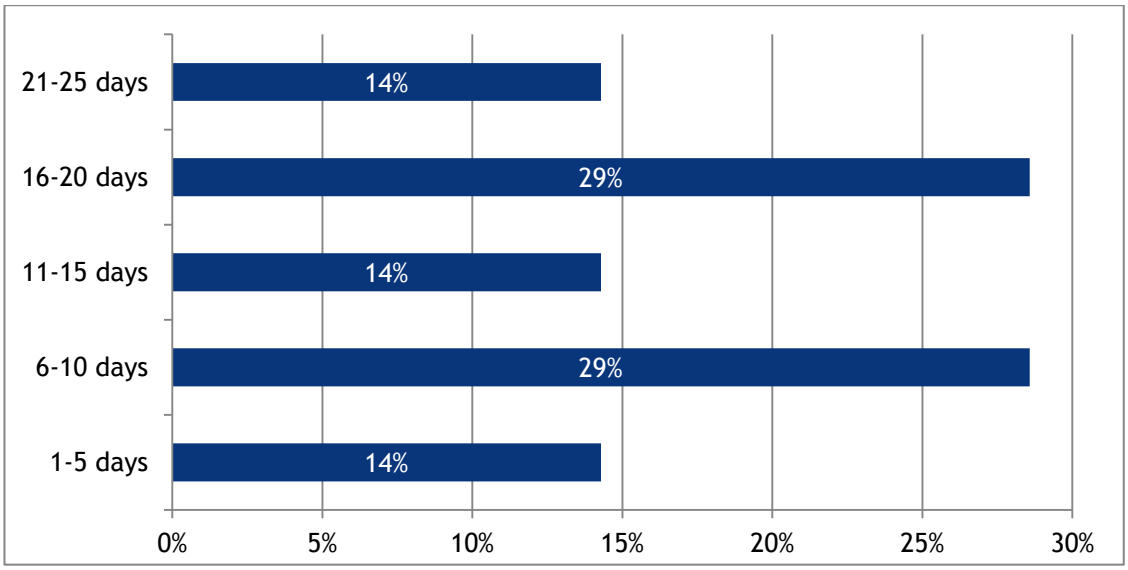
Source: Company interviews – RSM McClure Watters, 2014

Cells shaded indicate no significant change in NFQ level required for the occupation, while cells shaded indicate a higher NFQ level required and cells shaded indicate a corresponding decline in NFQ required

6.2.4 Training and Development

The companies were also asked about their training provision for their employees. Figure 6.4 shows that for the Maritime Monitoring, Security and Surveillance sector 29% of companies trained staff for between both 6-10 days and/or 16-20 days per year.

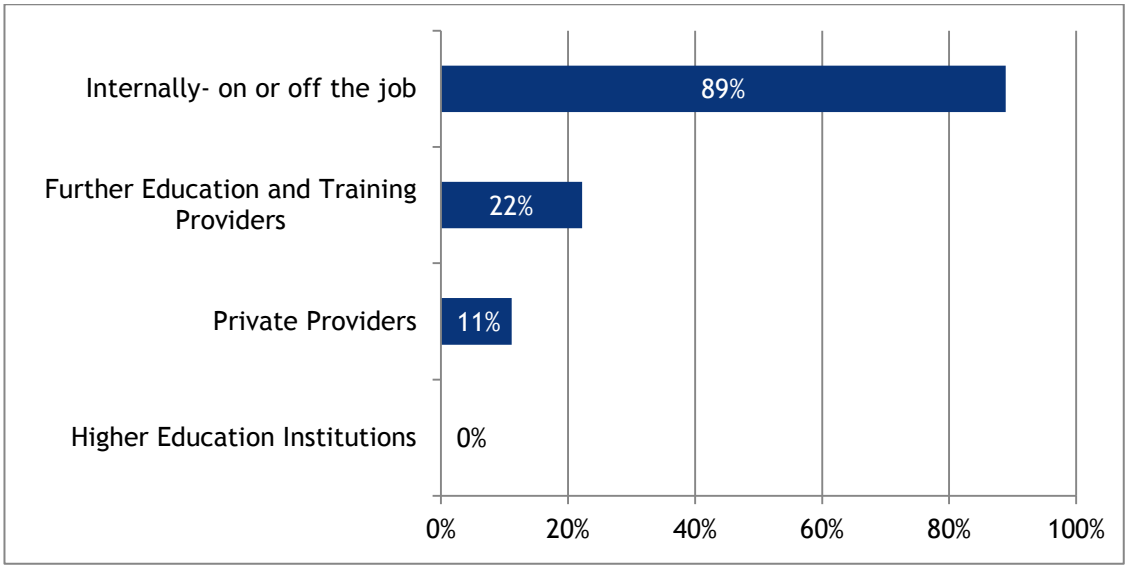
Figure 6.4: Number of Training Days in the Maritime Monitoring, Security and Surveillance sector



Source: Company interviews – RSM McClure Watters, 2014

Figure 6.5 shows that 89% used internal training.

Figure 6.5: How Training was delivered Days in the Maritime Monitoring, Security and Surveillance sector



Source: Company interviews – RSM McClure Watters, 2014

6.2.5 Availability of Personnel

Companies were asked about the availability of personnel with the relevant education, skills and expertise. A summary of the results in outlined in Table 6.5.

Table 6.5: Availability of Personnel for the Maritime Monitoring, Security & Surveillance sector

	Not enough people in my local area with right level of:					
	Education		Experience		Skills	
	N	%	N	%	N	%
Operative Grades	0	0%	0	0%	0	0%
Administration	0	0%	0	0%	0	0%
Skilled Trades	0	0%	2	22%	2	22%
Associate Professionals and Technical	4	44%	5	56%	1	11%
Professionals	3	33%	4	44%	0	0%
Management	0	0%	1	11%	0	0%
Base= 9						

Source: Company interviews – RSM McClure Watters, 2014

Table 6.5, indicates that companies have the most difficulty finding Professionals and Associate Professional and Technical persons (pink shaded cells). This is in line with the findings in the EGFSN report *Addressing Future Demand for High-Level ICT Skills*[136] which identified a global shortage of ICT skills. However, caution must be used in interpreting these results given the low response rate.

[136] http://www.skillsireland.ie/publication/egfsnSearch.jsp?ft=/publications/2013/title,11287,en.php

6.2.6 Difficulties Filling Current Vacancies and Skills Supply

Within the Maritime Monitoring, Security and Surveillance sector 78% of companies interviewed stated they had roles which were difficult to recruit into, these were identified as, IT software developers, environmental scientists, high quality admin, technical engineers, project managers and satellite technicians. Companies also stated they found it difficult to find engineers, particularly hardware, material, marine and radio frequency satellite engineers, environmental scientists and marine geophysicists with practical experience.

6.3 Stakeholder Consultation and Analysis

This sector is centred on technology products and services for marine activities and infrastructure. It is currently dominated by small start-up businesses, though these companies can grow rapidly as a result of being acquired or securing investments from venture capitalists and private investors or launching new products and expanding into international markets. A recent example is Cathx Ocean, which expects to more than double its workforce over the next 24 months with the creation of 50 additional jobs. This follows announcements on major deals for the supply of their subsea camera and laser based imaging technology to a large US customer.

Government support for research and the SmartOcean Ireland strategy launched in 2010 is promoting this sector with the aim of harnessing Ireland's natural marine resources and specialist expertise in Marine Science and ICT to establish Ireland as a leader in the development of high value products and services for the global marine sector. The development of an integrated enterprise strategy across development agencies and support for existing and new test-beds/facilities for demonstration and commercialisation purposes are two of the underpinning actions that the HOOW Development Task Force are addressing. An example of the research infrastructure is the Spiddal Test Site in Galway Bay, which is managed by SmartBay Ireland. In addition to supporting testing of wave energy devices, the test site led to collaboration between IBM and the Marine Institute on a pilot project to monitor wave conditions, marine life and pollution levels in and around Galway Bay. The pilot project uses real-time advanced analytics to transform large data sets, paving the way for smarter environmental management and development of the bay. Plans for further development of Ireland's Marine Research Infrastructure are under development, which could result in the growth of the site management companies, like SmartBay Ireland, in addition to fostering more start-up companies and attracting inward investment to Ireland.

The marine technology sector is one of the new growth areas for the ICT sector and companies are working on initiatives to develop this new market. Companies, small and large, will need skills on data handling, cloud computing and analytics, similar to those in the mainstream ICT sector. As with the ICT sector, these new technology skills will be a core requisite for every employee rather than contracting to third parties. With large global markets rapidly emerging in this area, new technology companies with high tech products and software solutions have the capacity to grow rapidly. Access to research infrastructure for prototyping and pilot trials paves the way for securing initial sales and customers.

6.4 Future demand for Maritime Monitoring, Security and Surveillance Skills, 2015-2020

6.4.1 Introduction

This section of the report deals with the potential future demand for skills in the Maritime Monitoring, Security and Surveillance sector over the period 2015-2020 arising from expansion of the sector and replacement of employees who retire, referred to as expansion and replacement demand respectively.

Scenario 1 assumes that the turnover target in Harnessing Our Ocean Wealth will to be met by 2020 and the impact that this would have on employment and skills demand is forecast. Consultations with industry stakeholders, informed by the economic background data gathered, were used to determine how this increase in turnover could be achieved, how the additional turnover would be distributed between the various industries making up the Maritime Monitoring, Security and Surveillance sector and how employment would need to increase in order to generate this turnover. A modelling exercise was then conducted using the information from the company interviews to estimate how the expansion demand would be distributed by occupational grade in each sub-sector over the period 2015-2020.

6.4.2 Scenario 1: Achieving the HOOW targets

6.4.2.1 Summary and Assumptions: Scenario 1

High Tech Marine Products and Services grew at 3.7% per annum between 2007 and 2010. ESRI and SOLAS forecast that IT Professional occupations will grow by 4% per annum between 2012 and 2020 and science occupations are projected to grow at 0.6% per annum over the period. Evidence from stakeholders indicates, however, that more rapid growth in the sector is possible - the main drivers behind which are as follows:

- The IMERC campus, along with support from Enterprise Ireland and IDA to promote new start-ups and attract FDI companies;
- The INFOMAR Programme – national integrated seabed mapping programme, funding applied research, providing free access to marine data and infrastructure, engaging and upskilling multiple SME's, training 2nd , 3rd level students and industry in marine survey operations, and with strong industry links to all major international survey technology providers.
- SmartOcean Ireland – a strategy developed with the aim of "Harnessing Ireland's Potential European and Global Centre for Ocean Technologies"
- Continued investment in the development of Ireland's research infrastructure, for example SmartBay in Galway and the "Irish Digital Ocean" platform;
- Support for the sector from existing FDI corporations based in Ireland, for example, the IBM business accelerator programme for Marine ICT aimed at accelerating the growth of early start-ups through mentorship, advice, technical support and helping the international growth of the business through partnerships and collaboration; and
- Horizon2020 funding and specific focus on "Blue growth".

The consensus view of the stakeholders is that these additional jobs could be created through the start-up of five micro businesses creating 3-5 jobs each; five SMEs creating 25-50 jobs each and one FDI creating 30-50 jobs. Cathx Ocean is one example of this potential job creation. They expect to

create 50 new jobs over the next 2 years having just completed a deal to supply US based Bluefin Robotics with their subsea camera and laser based imaging technology.

This indicates that 190 additional FTE jobs could be created between 2015 and 2020 - a 6% per annum growth rate. The subsector could grow to €83m in turnover and 647 FTEs in 2020, from the €56m and 391 FTE in 2010 figures – including trend growth of 4% per annum between 2010 and 2014, to a level of 457 FTE at the baseline of 2014.

6.4.3 Employment and Skills Implications

The distribution of the 190 additional FTE jobs by occupation level is shown in Table 6.7. The first column shows the 2014 FTE baseline estimate by occupation level. The next set of columns presents the expansion demand, the percentage of that figure to the 2014 baseline estimate for that occupation level and the percentage of the occupation expansion to the total expansion demand. Then follows the replacement demand - those leaving, e.g. due to retirement or change of occupation. The gross demand is the sum of the expansion and replacement demand and is the true reflection of the skills demand for the sector. Summed across the period 2015-2020, the total number of workers leaving is estimated to be 155 FTES, known as the replacement demand, which when summed with the expansion demand of 190 FTEs gives a gross demand of 345 FTE employees.

Table 6.7: Distribution of Expansion and Replacement Demand for the MMSS sector by occupation level

Occupation Level	2014 Baseline Estimate	% 2014 Total Baseline	Expansion Demand 2014-2020		% of Expansion demand	Replacement Demand 2014-2020		% of Replacement demand	Gross Demand		% of Gross demand
			No.	% of 2014		No.	% of 2014		No.	% of 2014	
Operatives	33	7%	0	0%	0%	14	42%	9%	14	42%	4%
Administrative	44	10%	43	98%	23%	28	64%	18%	71	161%	21%
Skilled Trades	15	3%	6	40%	3%	6	40%	4%	12	80%	3%
Associate Professionals & Technical	125	27%	46	37%	24%	32	26%	21%	78	62%	23%
Professionals	166	36%	70	42%	37%	55	33%	33%	125	75%	36%
Managers	74	16%	25	34%	13%	20	27%	13%	45	61%	13%
Total	**457**		**190**	**42%**		**155**	**34%**		**345**	**75%**	

Source: PACEC, 2014

The distribution of expansion demand (190 additional FTE jobs) by NFQ Level is shown in Table 6.6. The demand is concentrated in levels 8 and 9 of the framework (honours and masters degrees or equivalent). The increase in the number of professionals and associate professionals is 116 FTEs of the total 190 FTE of expansion which would account for the concentration of educational attainment at Levels 8 - 10.

Table 6.6: Distribution of Expansion demand by Educational Attainment at NFQ level for the MMSS sector

NFQ Level	Description	Expansion Demand
4 - 5	Secondary School Leaving Certificate	0
6 - 7	Higher Certificate / Advanced Certificate or Bachelors Degree	40
8	Honours Degree or Higher Diploma	73
9 - 10	Masters Degree / Postgraduate Diploma or Doctoral Degree	76
Net Total		190

Source: Company interviews – RSM McClure Watters, 2014

6.5 Supply Side Information

Marine Technology comprising maritime monitoring, security, surveillance and high-tech products is an emerging area and is the application of technology in the marine environment. The central roles in Marine Technology include: engineers, software developers, geo-scientists, satellite technicians, environmental scientists and hydrographers. With the exception of hydrography which is directly marine focussed all the others have applications outside of the marine. To work in marine technology an engineer or a software developer does not need any specific marine qualification, other than the regulatory safety requirement, but they could specialise through a postgraduate course in any number of the relevant areas identified in previous sections.

6.5.1 Hydrographic Surveying

Reliable maps of the seabed are essential for safe shipping and for effective management and conservation of the marine environment. While terrestrial maps are largely very accurate, seabed maps are much less so. Many 'current' nautical charts are based on data from the mid-19th century when depth was measured by lowering lead lines to the seabed at wide intervals.

Hydrography is the branch of applied science which deals with the measurement and description of the physical features of the navigable portion of the earth's oceans, seas and coastal areas and the prediction of their change over time. Hydrography's primary purpose is for safe navigation. Its secondary purpose is in support of all other marine activities, such as, oil and gas exploration and drilling and marine renewable energy; security and defence; scientific research; and environmental protection. Scientifically measuring, describing and depicting the seabed is crucial to the development of world trade and offshore expansion in the search for hydrocarbons.

A hydrographic surveyor specialises in precise positioning, data acquisition and processing in marine environments. Tasks, which vary depending on the specific area of work, can include:

- using specialised technical software and equipment including satellite and terrestrial positioning systems, sonars, single and multi-beam echo sounders, laser scanners and LiDAR equipped aircraft to provide data for the production of nautical charts and maps;
- using remotely operated and autonomous underwater vehicles to acquire data in deep oceans;
- using specialised technical software and geographical information systems (GIS) to manage the integration, processing and presentation of data;

- providing accurate and reliable information for other disciplines, such as, navigation, dredging, coastal works, seabed telephone cables, environmental monitoring, aquaculture, marine wind farm development, oceanographic research, bridge construction, and oil, gas and mineral resource exploration.

6.5.2 INFOMAR

The **IN**tegrated Mapping **FO**r the Sustainable Development of Ireland's **MA**rine **R**esource (INFOMAR) programme is a joint venture between the Geological Survey of Ireland (GSI) and the Marine Institute. The programme is a successor to the Irish National Seabed Survey (INSS) and concentrates on creating a range of integrated mapping products of the physical, chemical and biological features of the Irish seabed in the near-shore area.

Several Marine Technology companies have been funded under the INFOMAR programme to undertake research and to develop related technology and software solutions.

A team of marine geoscientists at the Geological Survey of Ireland (GSI) is also engaged in working with geological surveys and research institutes across Europe to bring together web-accessible, inter-operable marine geological and hydrographic datasets.

There is an international shortage of hydrographic surveyors. An MSc in Hydrography (Table 6.8) is available in Plymouth University for engineers or geoscientists. Currently hydrographers are trained on the job by the GSI and many are then headhunted by companies either in Ireland or abroad. An alternative route to become a hydrographer would be to undertake the Geomatics – Surveying and Mapping BSc in DIT. Geomatics, which in essence is the terrestrial form of hydrography, provides graduates with knowledge of cutting-edge technologies such as satellites, lasers, camera and advanced surveying and computing to collect data, Geographical Information Systems (GIS), Spatial Information Management, digital mapping and 3D modelling, all of which are used in hydrography.

Table 6.8: Survey Training Courses

Course Title	Institution	Award	Duration	2013 intake
Geomatics - Surveying and Mapping	Dublin Institute of Technology - DIT	BSc (hons)	4 yrs	18
Hydrography	Plymouth University (UK)	MSc	1 yr	

Source: List compiled by EGFSN-DJEI, Nov 2014

6.5.3 IMERC – the Irish Maritime and Energy Research Cluster

The Irish Maritime and Energy Research Cluster (IMERC) is a tripartite alliance between UCC, CIT and the Irish Naval Service. Its vision is to become a research and commercial cluster of world standing, to realise Ireland's potential in the global maritime and energy markets of tomorrow.

In order to exploit to its maximum the resources and core disciplinary strengths within IMERC, four thematic areas have become the focus around which the researchers, enterprise and institutions collaborate. The four areas are:

- Ocean engineering;
- Ecosystems Governance;
- Enabling Maritime Technologies; and
- Maritime Operations.

Ocean Engineering and Enabling Maritime Technologies are particularly relevant to the Marine Technology sub-sector. The postgraduate researchers linked to IMERC provide the research skills needs of the emerging maritime technology industry.

There do not appear currently to be any courses in Ireland which are directly and exclusively relevant to the Maritime Monitoring, Security and Surveillance subsector; however, general marine science qualifications are available, as are close substitutes from other disciplines such as engineering and ICT, as well as a wide range of short courses which would form the basic training required to convert someone with a generic or related degree into an effective marine operator.

6.6 Summary

This is emerging sector that grew in employment and turnover between 2007 and 2010 despite the recession. This sector is centred on high-tech marine products and services. It is currently dominated by small start-up businesses, though these companies can grow rapidly as a result of being acquired or securing investments from venture capitalists.

Scenario 1 -achieving the HOOW targets by 2020, maritime monitoring, security and surveillance estimates the creation of 190 new jobs. Replacement demand will require a further 155 FTEs giving rise to a gross demand of 345 FTEs largely concentrated in professional and associate professional occupations (61% of the total).

IMERC has found that across the global marine ICT sector, major players are not only interested in employees with PhD's and Masters but that over the next 5-10 years at the top of their recruitment list will be young ICT and Marine savvy Technicians who want to travel[137].

The development of an integrated enterprise strategy across development agencies and support for existing and new test-beds/facilities for demonstration and commercialisation purposes are two of the underpinning actions that the HOOW Development Task Force are addressing.

[137] http://smartocean.org/Portals/2/FORUM/Presentations/SmartOcean%20Forum%202013%20-%20Cormac%20Gebruers%20-%20Clustering%20Convergence%20Workforce%20skills%20%20Irelands%20Marine%20ICT%20Opportunity.pdf

Chapter 7: Summary of Skills Demand across the Marine Economy

7.1 Introduction

This chapter presents the aggregated and summarised demand forecasts for the entire marine economy by sector and occupation. The demand forecasts are presented in Table 7.1 showing the 2014 baseline employment estimate, expansion, replacement and gross demand for each sector by occupation and the aggregated total for each sector and occupation. Each figure is also given as a percentage of the 2014 baseline estimate.

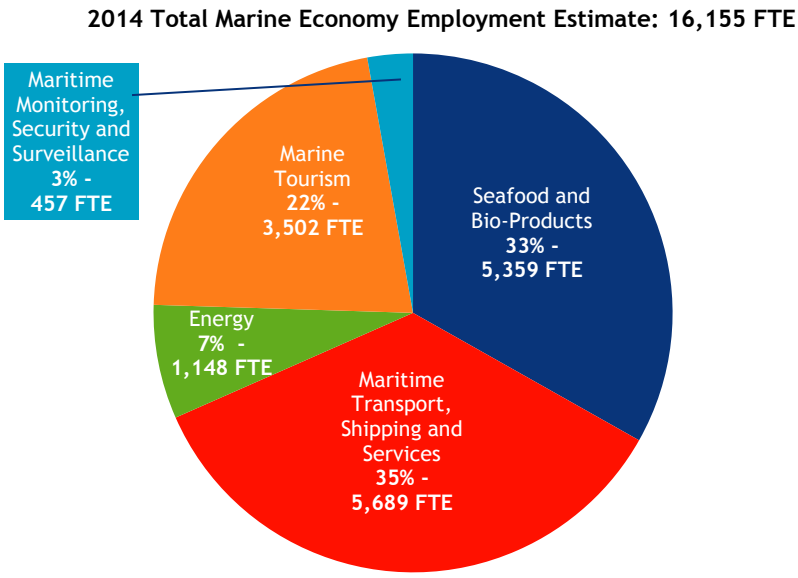
Table 7.1: Future skill demand to 2020 by occupation and subsector for the Marine Economy

		Seafood		MTSS		Energy		Tourism		Maritime Monitoring		Total	
Occupation		No.	% of 2014	No.	% of 2014	No.	% of 2014	No.	% of 2014	No.	% of 2014	No.	% of 2014
Operatives	2014 baseline	3,043	-	814	-	47	-	1,604	-	33	-	**5,541**	-
	Expansion	514	17%	850	104%	3	6%	1,705	106%	0	0%	**3,072**	55%
	Replacement	1,296	43%	476	58%	23	49%	1,100	69%	14	42%	**2,909**	52%
	Gross	1,810	59%	1,326	163%	26	55%	2,805	175%	14	42%	**5,981**	108%
Admin	2014 baseline	392	-	445	-	70	-	422	-	44	-	**1,373**	-
	Expansion	180	46%	651	146%	2	3%	371	88%	43	98%	**1,247**	91%
	Replacement	179	46%	283	64%	32	46%	164	39%	28	64%	**686**	50%
	Gross	359	92%	934	210%	34	49%	535	127%	71	161%	**1,933**	141%
Skilled Trades	2014 baseline	934	-	1,727	-	166	-	506	-	15	-	**3,348**	-
	Expansion	237	25%	821	48%	8	5%	519	103%	6	40%	**1,591**	48%
	Replacement	344	37%	706	41%	67	40%	265	52%	6	40%	**1,388**	41%
	Gross	581	62%	1,527	88%	75	45%	784	155%	12	80%	**2,979**	89%
Associate. Professional and Technical	2014 baseline	45	-	803	-	125	-	253	-	125	-	**1,351**	-
	Expansion	0	0%	793	99%	31	25%	222	88%	46	37%	**1,092**	81%
	Replacement	10	22%	261	33%	41	33%	57	23%	32	26%	**401**	30%
	Gross	10	22%	1,054	131%	72	58%	279	110%	78	62%	**1,493**	111%
Professional	2014 baseline	365	-	1,183	-	603	-	295	-	166	-	**2,612**	-
	Expansion	373	102%	1,416	120%	96	16%	259	88%	70	42%	**2,214**	85%
	Replacement	129	35%	452	38%	204	34%	74	25%	55	33%	**914**	35%
	Gross	502	138%	1,868	158%	300	50%	333	113%	125	75%	**3,128**	120%
Management	2014 baseline	580	-	717	-	137	-	422	-	74	-	**1,930**	-
	Expansion	119	21%	397	55%	10	7%	371	88%	25	34%	**922**	48%
	Replacement	136	23%	195	27%	36	26%	92	22%	20	27%	**479**	25%
	Gross	255	44%	592	83%	46	34%	463	110%	45	61%	**1,401**	73%
Total	**2014 baseline**	**5,359**	-	**5,689**	-	**1,148**	-	**3,502**	-	**457**	-	**16,155**	-
	Expansion	**1,423**	27%	**4,928**	87%	**150**	13%	**3,447**	98%	**190**	42%	**10,138**	63%
	Replacement	**2,094**	39%	**2,373**	42%	**403**	35%	**1,752**	50%	**155**	34%	**6,777**	42%
	Gross	**3,517**	66%	**7,301**	128%	**553**	48%	**5,199**	148%	**345**	75%	**16,915**	105%

Source: PACEC, 2014

To understand at a glance the makeup of the marine economy Figure 7.1 presents the distribution of the five marine sectors as a percentage of the 2014 employment estimate for the total marine economy.

Figure 7.1: Marine Economy Sectors as % (by employment) of the whole Marine Economy



7.1 Future Skills Demand by Sector

The current employment across the entire marine economy is 16,155 full-time equivalents.

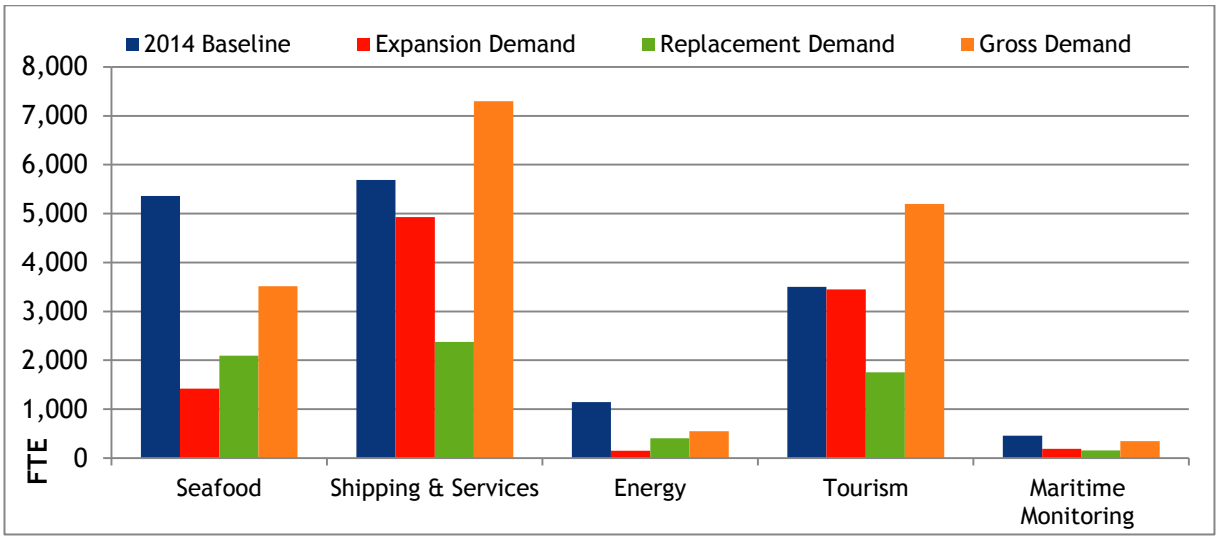
Figure 7.2 presents the 2014 FTE employment estimate, and the future skills expansion, replacement and gross demand by sector. Across the five broad sectors, the total expansion demand for Scenario 1, i.e., meeting the HOOW targets, is forecast to be 10,138 FTE jobs, with the largest expansion of 4,928 in maritime transport, shipbuilding and services (driven primarily by the 3,500 expansion demand arising from the proposed International Shipping Services Centre (ISSC)) with marine tourism following with a 3,447 FTE expansion demand, reflecting the upturn in the global economy and the return of foreign tourists. If the growth in the seafood and bio-products sector does not occur owing to lack of growth in aquaculture then the total expansion is 8,715 (10,138 less 1,423).

The replacement demand is greatest in terms of actual numbers for the Maritime Transport, Shipbuilding, and Services (MTSS) (2,373) and Seafood and Bio-Products (2,094) sectors but in terms of the percentage of the 2014 baseline employment marine tourism has the greatest replacement demand at 50% (1,752) of its current work force to be replaced over the period to 2020.

The sectors with the greatest skills demand are maritime transport, shipbuilding, and services (MTSS), marine tourism, and seafood. In the case of seafood unlike MTSS and marine tourism the replacement demand is greater than the expansion demand.

Over the entire Marine Economy the replacement demand is 6,777 some 3,361 less than the expansion demand. The total gross demand out to 2020 for the Marine economy is 16,915 FTE positions.

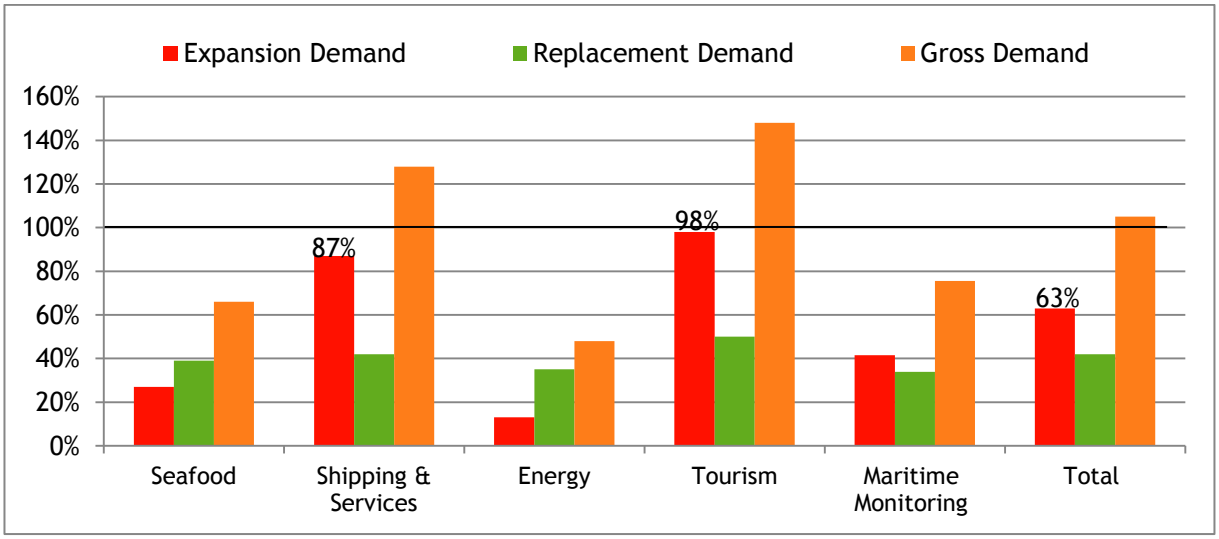
Figure 7.2: Future Skill Demand by Sector



Source: PACEC, 2014

In Figure 7.3 the expansion, replacement and gross demand are displayed as a percentage of the current 2014 employment. In the case of tourism while its expansion demand is only 2nd highest, after MTSS, as a percentage of the 2014 employment it has the largest expansion at 98%, meaning employment in tourism will almost double by 2020. Both MTSS and tourism are forecast to expand at a rate greater than the expansion demand of the total marine economy which is forecast to expand, in employment, by 63%.

Figure 7.3: Future Skill Demand by Sector as a % of the 2014 FTE Baseline estimate for the occupation



Source: PACEC, 2014

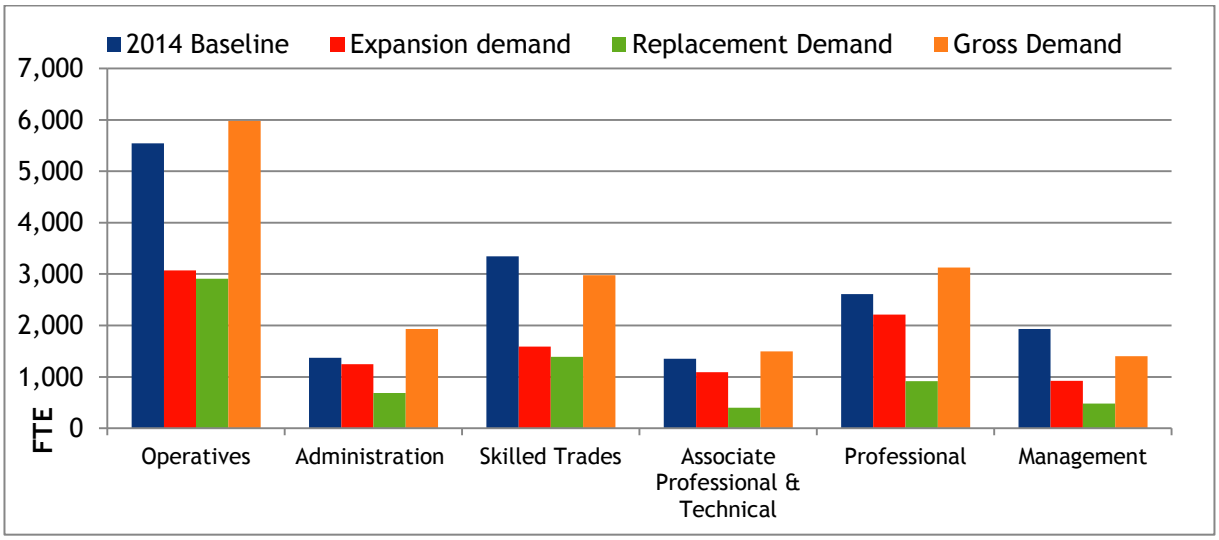
7.2 Future Skills Demand by Occupation across the total Marine Economy

Operatives comprise the largest occupation across the marine economy with a 2014 baseline estimate of 5,541 FTEs which is 34% of the total full-time employment. Not surprisingly, therefore, it is also the occupation category with the largest expansion demand of 3,072 (30% of the expansion demand). This reflects the nature of much of the work within the marine economy. There is also strong expansion demand for professionals (2,214 FTE (22% of total expansion)) which reflects the expansion demand arising from the ISSC but also the anticipated professionalisation of enterprises within the marine economy.

Skilled Trades is the next largest occupation category at 3,348 FTEs (21% of the total marine economy, Figure 7.5) and has an expansion demand of 1,591 FTEs which is 48% of the total 2014 skilled trade employment (Figure 7.6) and 16% of total expansion (Figure 7.5) reflecting the skilled nature of the work within the marine economy.

The occupations generating the highest gross demand are operative roles (5,981 FTE, or 35% of the total gross demand). This is driven by expansion in the tourism sector (where expansion demand exceeds replacement demand (Figure 7.2), and the high proportion of operatives in seafood. There is also strong gross demand for professionals (3,128 FTE) and skilled trades (2,979 FTE), the former being driven by the ISSC.

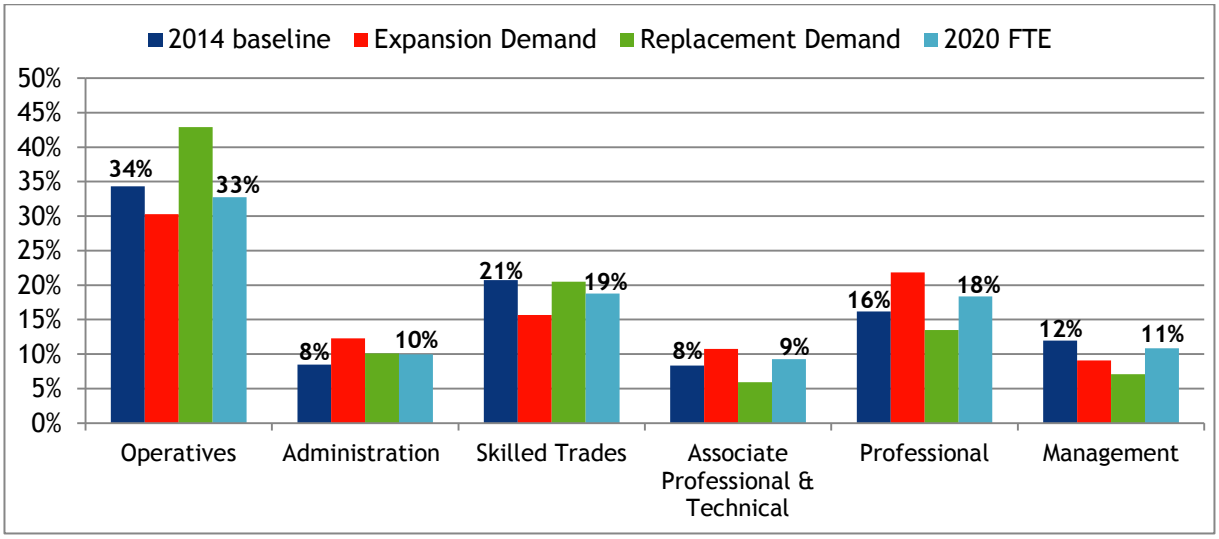
Figure 7.4: Future Skills Demand by Occupation Grade for the whole Marine Economy



Source: PACEC, 2014

While professionals have a lower 2014 baseline employment then for skilled trades their expansion demand is greater at 2,214 FTE which is 22% of total expansion (Figure 7.5) and 85% of the 2014 professional FTE (Figure 7.6), which is almost a doubling of the number of professionals working in the marine economy by 2020.

Figure 7.5: Proportion of an Occupation to the total within the displayed cohort



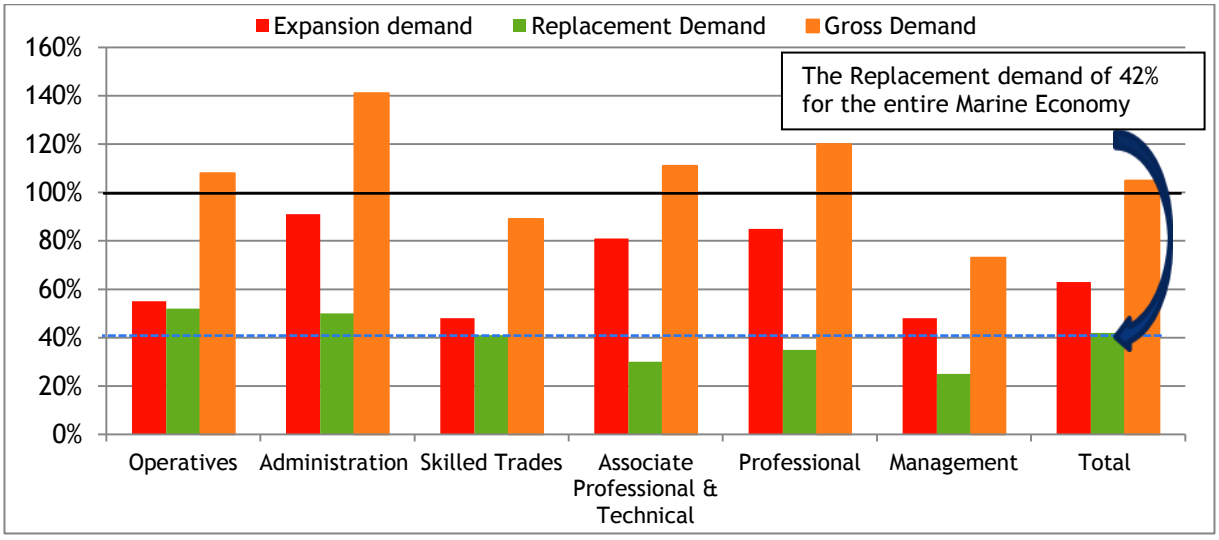
Source: PACEC, 2014

The proportion of an occupation to the total employment in 2014 and that forecast for 2020 is not hugely different. The largest component is operatives at 34% in 2014 and 33% in 2020 with the replacement demand greater than the expansion demand.

In the case of professionals the opposite picture emerges with the composition of professionals rising from 16% of total employment in 2014 to 18% in 2020 and the expansion demand in this case is greater than the replacement demand, largely driven by the ISSC. This is further emphasised when we take the combined professional and associate professional & technical occupations, which is 33% (22% and 11% respectively) of the total expansion demand, whereas the 2014 combined professional and associate professional FTE is 24% (16% and 8% respectively) (Figure 7.5) of the total marine employment. This 9% increase also points to an increasing professionalisation of the marine economy and the expansion of the emerging sectors which require more professionals in the initial years.

The expansion demand for the marine economy is 63% of the 2014 FTE employment. It is interesting to note that the expansion for professionals, associate professionals and technical and administration are all higher than this. While this indicates a degree of professionalisation of the marine economy all of these occupations are starting at a lower base which would also account for the higher percentage. However from Figure 7.4 we see that the expansion of professionals, at 2,214 FTEs, is the second highest after operatives (3,072). This is an 85% increase in the number of professionals (Figure 7.6).

Figure 7.6: Future Skills Demand by Occupation as % of 2014 baseline for the occupation



Source: PACEC, 2014

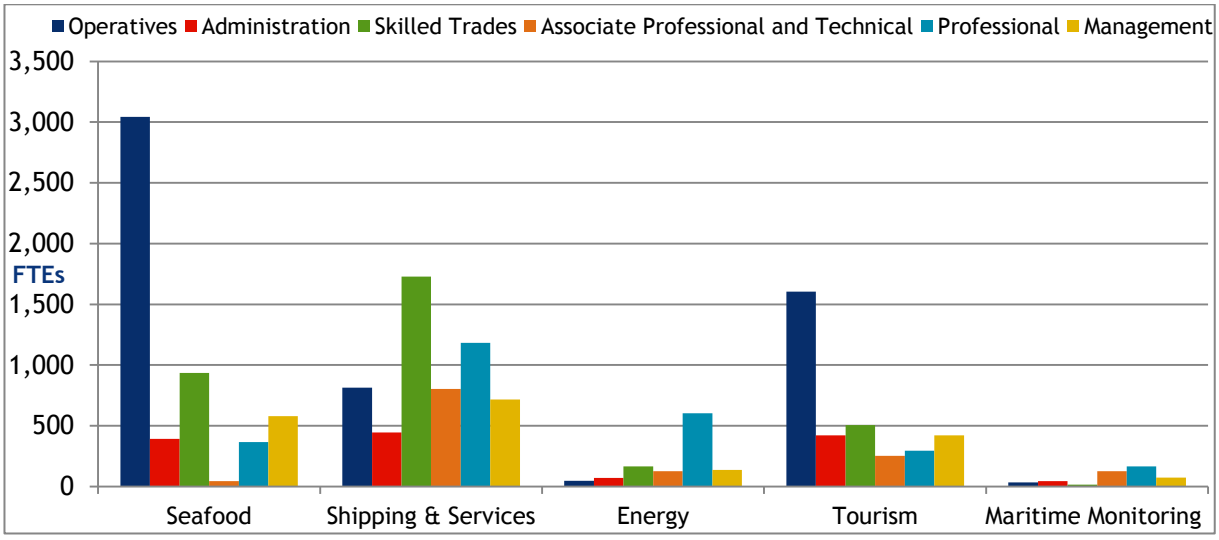
7.3 Future Skills Demand by Sector and Occupation across the Marine Economy

The jobs in the marine economy straddle the full range of occupations from managerial and professional to operatives. While many of the skills are the same as for land based jobs with some additional upskilling required in order to work in the marine environment, e.g. electricians, others are specific to the marine economy, such as tug operators, Ship Captains and Naval Architects where very specific education and training is required. For many other occupations such as engineers in the energy sector this requires an engineering degree e.g. mechanical or electrical followed by a masters degree. Table 7.2 presents the typical jobs by occupational level for each of the marine sectors.

Table 7.2: Typical jobs by occupation and Marine Sector

Occupation	Seafood and Bio-Products	MTSS	Energy	Tourism	Maritime Monitoring
Operative Grades	General Operatives, Fish Filleters, Boat Crew, Deckhands, Riggers	Stevedores, Tug Operators, Crane Operators, Deckhands, Boat Crew, Riggers	General Operatives, Riggers, Boat Crew	Bar Staff, Waiting staff, Cleaners, Drivers, Retailers, General Operatives	General Operatives
Administration	HR staff, General Administrators, Receptionists	HR staff, General Administrators, Receptionists	HR staff, General Administrators, Receptionists	HR staff, General Administrators, Receptionists	HR staff, General Administrators, Receptionists
Skilled Trades	Radio Operators, Production Supervisors, Maintenance Technicians, Mechanics, Electricians, Skippers - Deck Officer, Fishermen, Divers	Harbour & Berthing Masters, Bunker Brokers, Pilots, Radio Operators	Mechanics, Electricians, Technicians: Maintenance; Fabrication; and Welding	Chefs, Tour operators/Guides, Life Guards, Boat Builders, Instructors: Sailing; Wind surfing; Canoeing/Sea Kayaking; Adventure Sports; and Angling. Technicians: Maintenance; Marine engine; and Electricians	Mechanics and Electricians, Maintenance Technicians, Divers
Associate Professional & Technical	Production and Process Development technicians, Pollution Control Personnel, Safety Officers, Quality Assurance Technicians, Lab Technicians, Market Development Staff, Nature Conservationists	Marine Insurance Agents, Marine Underwriters, Ship Agents, Freight Forwarders, Commodity Traders, Charterers, Ship Brokers, Ship Chandlers and Equipment Suppliers	IT Technicians, Software Development Technicians, Hardware Developers	Engineering Technicians and IT Technicians	Web Developers, Programmers/ Software Developers, Technical Sales Staff
Professionals	Marine scientists, Marine biologists, Fishery Scientists, Microbiologists, Botanists, Earth & Ocean scientists, Geneticists, Food Chemists, Food Technologists, New Product Development Technologists, Food Process Engineers, Chemical Engineers, Environmental Scientists, Marine Spatial planners, Fish Veterinarians, Quality Auditors, Food Economists, Engineering Officer (Fishing Vessel)	Master Mariners and other Deck Officers, Engineering Officers, Naval Architects, Marine Surveyors, Hull Surveyors, Cargo Surveyors, Maritime Analysts, Shipping Accountants & Lawyers, Hydrographic Surveyors, Marine Planners	Marine Engineers; Geophysicists, Hydrographic surveyors, Production & Facilities Engineers, Environmental & Chemical Engineers, Structural & Mechanical Engineers, Power Systems, Smart Grid Engineers, Wave Scientists, Data Systems Analysts, Naval Architects, Marine Surveyors, Oceanographers, Naval architects, Master Mariners and other Deck Officers, Engineering Officers	Marketing and Public Relations Staff, Translators, Environmental Managers	Engineers:- Network; Telecoms; Software; Electronic; and Civil/Structural. Systems Analysts, Data Analysts, Geoscientists, Oceanographers, Marketing Managers
Management	Managing Directors, Plant Managers, Accountants, Production Managers, Legal and Marketing Professionals	Directors Project Managers, Fleet Managers	Site Development Managers, Marine Operations Managers	Managers: Adventure Centres, Hotel and Catering, and Marine Parks	Entrepreneurs, CEOs, Project Managers

Figure 7.7: 2014 Baseline Distribution of Occupation by Marine Sector



Source: PACEC, 2014

Figure 7.7 presents the distribution of occupation by sector. What this highlights is that operatives are the largest occupation for Seafood and Tourism. Skilled trades are the largest occupation for the Maritime Transport, Shipbuilding and Services (MTSS). Not surprisingly Professionals are the largest occupation for Energy and Maritime Monitoring although the numbers are small. Professionals are the second largest component for MTSS.

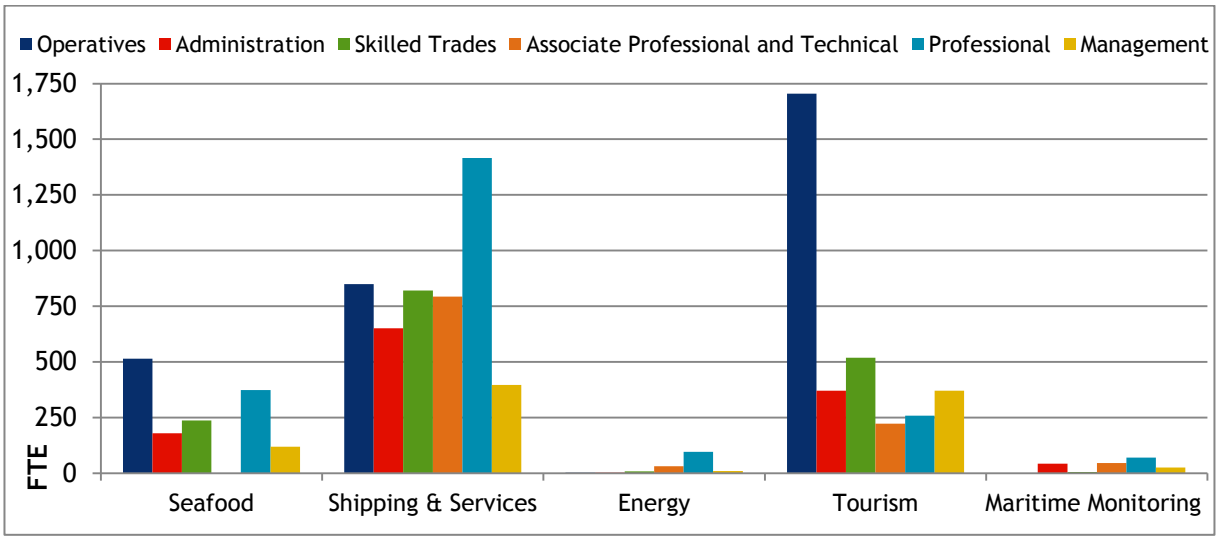
This section examines the skills demand by occupation and sector which demonstrates clearly the contrasting skills demand in the different sectors. The Figures 7.8 and 7.9 show the difference between the expansion and replacement demand for each occupation and sector.

The sector Maritime Transport, Shipping and Services requires the largest number of professionals largely attributed to the ISSC. The largest component of the expansion demand is for operatives in tourism. Seafood also requires 373 professionals which is 26% of seafood's total expansion demand. While energy and maritime monitoring have small numbers their largest expansion is for professionals as both these sectors are emerging.

The picture of the replacement demand is somewhat different to the expansion demand. The single biggest difference is the large number of operatives for seafood at 1,296 FTEs compared to the expansion demand of 514 FTE operatives.

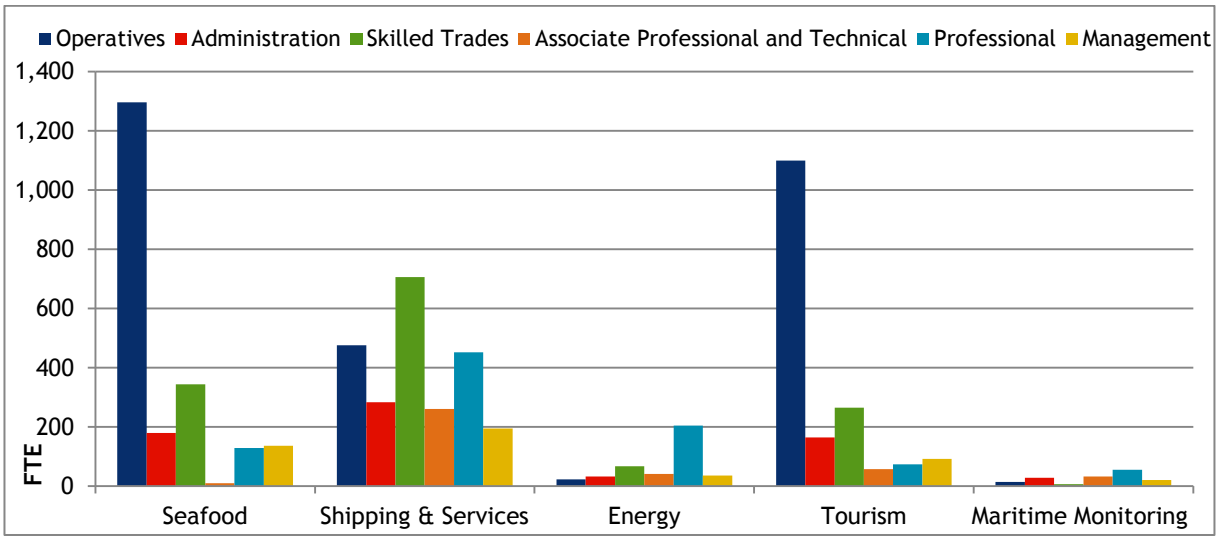
Replacement demand is higher for operatives and low skill occupations compared to professional and managerial occupations, so the sectors with a higher proportion of employees as operatives such as tourism and seafood have a higher replacement demand.

Figure 7.8: Expansion Demand by Occupation Group within a Marine Sector



Source: PACEC, 2014

Figure 7.9: Replacement Demand by Occupation Group within Marine Sector



Source: PACEC, 2014

7.4 Summary

There are many opportunities for a career in the marine economy. As most of the industry is in coastal areas it therefore provides employment opportunities in these rural areas. Many of the skills are transferable across the different sectors, e.g. fishermen providing services to the offshore energy sector, merchant seafarers finding employment in the ports after years of experience working at sea.

The sectors with the greatest skills demand are seafood, maritime transport, shipbuilding, and services (MTSS) and marine tourism. The replacement demand for the seafood sector is greater than

its expansion demand, as the replacement demand of the operative-grade jobs, prevalent in the sector, is higher than that for professional or managerial grades. In the case of tourism the expansion demand is greater than the replacement demand even though like the seafood sector it has a large number of operatives but this sector is expected to double its FTEs by 2020. In the case of MTSS the largest component of its expansion demand is for professionals. In seafood the workforce is ageing and this will present a skills difficulty unless measures are put in place to attract and upskill younger workers.

A key finding in the course of the study is the concept of "marinisation". Many of the occupations and qualifications are not specific to the marine economy, e.g., engineers and software developers, managers, professionals in law, accountancy and business development, but they can be "marinised" – that is, additional training or a top up qualification in a marine context. "Marinisation" applies across the full spectrum of occupations and qualifications such that a mechanical engineer, an electrician or a construction worker can upskill or "marinise" his/her skills and be able to work in a marine or off-shore environment. This upskilling or "marinising" of a skill provides more employment opportunities.

In addition to "marinising" traditional disciplines and training, ICT skills need to be embedded in existing maritime education and training as the pervasiveness of ICT in all aspects of the economy, including the ocean economy, takes hold. This extends to all occupations and the ICT skills of coastal communities needs to be improved so that ICT becomes an integral part of the marine economy.

Chapter 8: Recommendations

1 Establish a Marine Discover Programme modelled on the SFI Discover Programme to raise awareness among primary, second and third level students and the Irish public about the range of careers opportunities in the Marine Economy.

The SFI Discover Programme, seeks to promote the awareness and engagement of the Irish public with science, technology, engineering and maths (STEM), to increase interest in STEM among students, teachers and members of the public and to contribute to Ireland's continued growth and development as a society – one that has an active and informed interest and involvement in STEM.

A Marine Discover Programme should broadly follow the model used by SFI and in many cases would be part of the SFI Discover programme where the STEM subjects would be of relevance to the marine sector.

The Marine Institute should lead on and be the co-ordinator for this programme. Other organisations that should be involved are: Bord Iascaigh Mhara (BIM) The Maritime Development Organisation (IMDO), Fáilte Ireland, Maritime Safety Directorate and Marine Survey Office in Department of Transport, Tourism and Sport (DTTAS), SFI, SOLAS, HEA, IUA, IOTIs, NMCI, Institute of Career Guidance Councillors, Geological Survey of Ireland (GSI) and DCENR, Industry bodies and private training providers.

Lead: Marine Institute on behalf of the Marine Co-ordination Group

2 Monitor the skills needs in each sub-sector of the Marine Economy on an ongoing basis to ensure a sufficient supply of skills is available as the trigger points for accelerated growth of a sub-sector are reached.

When the International Shipping Services Centre (ISSC) is established with the predicted creation of 3,500 jobs, measures will need to be put in place to ensure there is a sufficient supply of qualified personnel, such as shipping brokers, legal and business professionals with knowledge of the maritime industry.

As the process for aquaculture licensing becomes streamlined and the number, size of farms and production increases there will be an increased demand for the skills in aquaculture.

As activity increases facilitated by the 2015 licensing round for oil and gas exploration and proposals for a new fiscal regime which would accelerate if there was a find, there will be a greater demand for skills. While the time scales for this process will give sufficient time to put measures in place the situation will need to be monitored.

Lead: Marine Co-ordination Group

3 Update Marine Economy data regularly to ensure accurate data
The SEMRU (Socio Economic Maritime Research Unit, NUIG) publication "Ireland's Ocean Economy" which was published in December 2013, with 2010 as the data reference year and the 2010 publication with 2007 reference data is a cross cutting look at the entire marine economy and which was the reference data used in HOOW. However, there is a considerable time lag with the data owing to a time lag with the CSO data. The HOOW Development Task Force is addressing this issue as the need to have more up to date information to enable monitoring the performance of the Ocean Economy is accepted as being an imperative. BIM surveys provide information on the seafood sector that could be used to monitor development and growth of employment and IMDO are piloting a survey scheme in relation to maritime shipping companies. Ireland's Ocean Economy should be updated, at a minimum every 2 years, to provide a more accurate and up-to-date set of figures of the economic profile of the marine economy which would facilitate a watching brief of the growing areas and the likely areas that will need more skills.
Lead: Marine Co-ordination Group, Marine Institute and SEMRU

4 Develop a mentoring programme for the Seafood sector.
The seafood subsector has an ageing workforce and the development of a mentoring programme so that those who will be retiring over the next few years can pass on their knowledge and experience to those younger than them would ensure their experience and expertise won't be lost to the sector. It could also include the possibility of retaining the retirees as mentors for a period so the depth of expertise can be passed on.
Lead: BIM

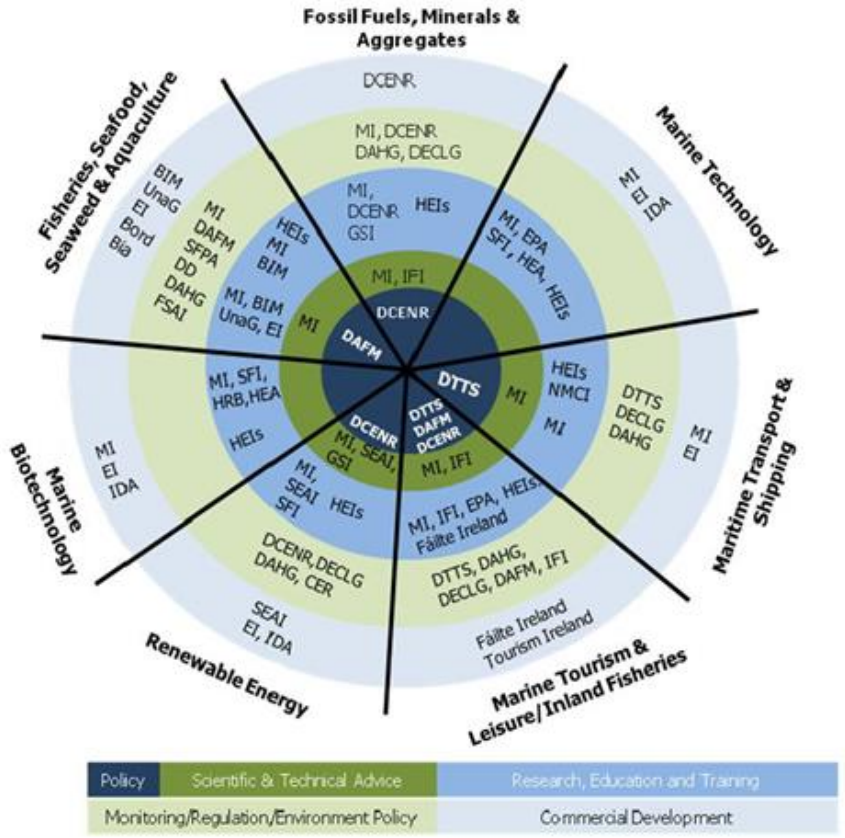
5 Develop a data-collection and biological sampling course for fishermen
Fishermen trained in data-collection and biological sampling would be in a position to provide consistent and valuable data to researchers and industry/science partnership initiatives. Scientists and fishery managers are aware of the problems arising from lack of sufficient good quality data and using fishermen to provide timely and accurate data would be a significant advantage.
Lead: BIM

6 Provide ICT Training to coastal communities and workers in the marine economy
ICT skills need to be more broadly available to the coastal community as many people living in these areas have little knowledge or experience of ICT. An outcome from this initiative would be more mainstream use of ICT with the marine economy
Lead: BIM, in conjunction with SOLAS, ETBs and NALA

Appendices

Appendix I: Marine Governance

Responsibility for marine activities is spread across a number of government departments and agencies depending on their functions.



Source: Our Ocean Wealth – Briefing document, Part 1: Context (courtesy of the Marine Institute)

MI: Marine Institute	**DAFM**: Department of Agriculture, Food and Marine
EI: Enterprise Ireland	**EPA**: Environmental Protection Agency
SFI: Science Foundation Ireland	**DCENR**: Department of Communications, Energy and Natural Resources
HEIs: Higher Education Institutions	**NMCI**: National Maritime College of Ireland
HEA: Higher Education Authority	**FSAI**: Food Safely Authority of Ireland
HRB: Health Research Board	**DECLG**: Department for the Environment, Community and Local Government
GSI: Geological Survey of Ireland	**SFPA**: Sea Fisheries Protection Authority
IFI: Inland Fisheries Ireland	**SEAI**: Sustainable Energy Authority of Ireland
DD: Department of Defence	**DTTS**: Department of Transport, Tourism and Sport
UnaG: Údarás na Gaeltachta	**DAHG**: Department of Arts, Heritage and the Gaeltacht
BIM: Bord Iascaigh Mhara	**CER**: Commission for Energy Regulation
IDA: Industrial Development Authority	

Appendix 2: Marine Economy NACE Codes (Rev 2)[138]

The Ocean Economy is extremely diverse and comprises multiple NACE codes, some of which are fully in the Ocean Economy and some only partially.

Section	Division	Class	Description	Marine Share: F=Fully P=Partial
A	**3**	**3.11**	**Marine fishing**	**F**
A		**3.21**	**Marine aquaculture**	**F**
B	6	6. 1	Extraction of crude petroleum	P
B	6	6.2	Extraction of natural gas	P
B	8	8.12	Operation of gravel and sand pits; mining of clays and kaolin	P
B	**8**	**8.93**	**Extraction of salt**	**F**
B	9	9.1	Support activities for petroleum and natural gas extraction	P
B	9	9.9	Support activities for other mining and quarrying	P
C	**10**	**10.2**	**Processing and preserving of fish, crustaceans and molluscs**	**F**
C	**30**	**30.11**	**Building of ships and floating structures**	**F**
C	**30**	**30.12**	**Building of pleasure and sporting boats**	**F**
C	**33**	**33.15**	**Repair and maintenance of ships and boats**	**F**
D	35	35.11	Production of electricity	P
D	35	35.12	Transmission of electricity	P
E	38	38.31	Dismantling of wrecks	P
E	39	39	Remediation activities and other waste management services	P
F	42	42.21	Construction of utility projects for fluids	P
F	42	42.22	Construction of utility projects for electricity and communication	P
F	42	42.91	Construction of water projects	P
F	42	42.99	Construction of other civil engineering projects n.e.c.	P
F	43	43.99	Other specialised construction activities n.e.c.	P
G	46	46.38A	Wholesale of other food, including fish, crustaceans and molluscs	P
G	**47**	**47.23**	**Retail sale of fish, crustaceans and molluscs in specialised stores**	**F**
H	49	49.5	Transport via pipeline	P
H	**50**	**50.1**	**Sea and coastal passenger water transport**	**F**
H	**50**	**50.2**	**Sea and coastal freight water transport**	**F**
H	50	50.3	Inland passenger water transport	P

[138] NACE Code is a Statistical classification of economic activities in the European Community. http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(NACE)

Section	Division	Class	Description	Marine Share: F=Fully P=Partial
H	**52**	**52.22**	**Service activities incidental to water transportation**	**F**
H	50	50.4	Inland freight water transport	P
H	52	52.24	Cargo handling	P
H	52	52.29	Other transportation support activities	P
I	55	55.1	Hotels and similar accommodation	P
I	55	55.2	Holiday and other short-stay accommodation	P
I	55	55.3	Camping grounds, recreational vehicle parks and trailer parks	P
I	56	56.1	Restaurants and mobile food service activities	P
I	56	56.3	Beverage serving activities	P
K	65	65.12	Non-life insurance	P
K	65	65.2	Reinsurance	P
M	71	71.11	Architectural activities	P
M	71	71.12	Engineering activities and related technical consultancy	P
M	71	71.2	Technical testing and analysis	P
M	72	72.19	Other research and experimental development on natural sciences and engineering	P
N	77	77.21	Renting and leasing of recreational and sports goods	P
N	77	77.34	Renting and leasing of water transport equipment	P/F
O	84	84.13	Regulation of and contribution to more efficient operation of businesses	P
O	84	84.22	Defence activities	P
O	84	84.24	Public order and safety activities	P
P	85	85.32	Technical and vocational secondary education	P
P	85	85.41	Post-secondary non-tertiary education	P
P	85	85.42	Tertiary education	P
P	85	85.51	Sports and recreation education	P
R	93	93.11	Operation of sports facilities	P
R	93	93.12	Activities of sport clubs	P
R	93	93.19	Other sports activities	P
R	93	93.21	Activities of amusement parks and theme parks	P
R	93	93.29	Other amusement and recreation activities	P

Source: SEMRU's Ireland's Ocean Economy - Ref year 2010, published Dec 2013

Appendix 3: Marine Economy Occupations

Jobs in the Marine Economy straddle the full range of occupations from Managerial and Professional to Operatives. Many of the skills are also common to land based jobs and individuals can upskill for a marine environment. The following list was taken from *Our Ocean Wealth - Background Briefing Document, Part III*.

Ocean economy sub-sector	Jobs
Seafood and Bio-Products: ▪ Sea Fisheries ▪ Aquaculture ▪ Seafood Processing	Food technologists, microbiologists, food production, food processing, food analysts,; marine biology, fishery scientists, botanists, environmental scientists, maintenance technicians, fishermen, ships officers, marine engineers, boat crew, radio operators, animal nutritionist, veterinarians, geneticists, environmental management, nature conservation, pollution control, environmental consultancy, quality assurance technicians, quality auditors, lab technicians ,food process engineers, new product development technologists, food economist, production supervisor, process technician, market development staff, production managers, general operatives, mechanical and electrical trades
▪ Marine Biotechnology and bio-processing	Product and process development, quality analysts, safety officers, geneticists, chemists, biologists, botanists, biotechnologists, molecular biologists, biochemists, geneticists, laboratory and medical technicians and mathematicians, biostatisticians and statisticians, bioinformatics, process engineers, food technologists and scientists, nutritionists, veterinarian., medical doctors, microbiologists, fishery scientists, sales and marketing, data analysis, synthetic biologists, wide range of process technicians and plant operators, chemical engineers and process engineers.
Maritime Transport, Shipbuilding and Services: ▪ Shipping & Maritime Transport; ▪ Marine Manufacturing, Engineering & Construction ▪ Marine Retail Services ▪ Marine Commerce	Ship brokers, commodity traders, bunker brokers, charterers, ship operations, maritime analysts, fleet managers, Ship agents, pilots, tug operators, STCW training providers (health and safety training aboard), Ship Chandlers and equipment suppliers, Freight Forwarder, Marine Economics, crew, naval architects, marine surveyors, hull surveyors, cargo surveyors master mariners and other deck officers, chief engineers and marine engineers, shipping lawyers, radio operators, marine insurance (marine underwriters, hull and machinery, cargo claims), shipping accountants.
Energy ▪ Oil and Gas Exploration and Production	Geologists, geophysicists, hydrologists, mineralogists, drilling engineers reservoir engineers production engineers facilities engineers energy economists environmental engineering, riggers, rough-necks and general operatives, network systems and data systems analysts, chemical engineers, naval architects, marine surveyors, master mariners and other deck officers.

Ocean economy sub-sector	Jobs
Energy ▪ Marine Renewable Energy - Offshore wind, Wave and Tidal	Software development engineer, market data analysis, IT controller, hardware developer, turbine monitoring and diagnostic engineer, smart grid engineer, power systems software engineer, electrical engineer, process engineer, marine energy engineer, site development manager, marine operations manager, economist, structural engineer, hydrologists, mechanical design engineer, wave scientists, fabrication and welding technicians.
Marine Tourism	Guides, hotel and catering management, chefs, bar staff, beauty therapists, boat builders, sports and fitness trainers, retailer staff, marketing and public relations, accountants, drivers, maintenance staff, translators, tour operators, angling instructors, environmental management. marine park and oceanarium management, museum curatorship, teaching/training and teaching support (filmmaking, etc.)
Maritime Monitoring, Security and Surveillance including Marine ICT and Smart Ocean	Programmer/software developers, systems analysts, web developer, network engineers, telecoms engineers, technical sales, marketing, software engineers, project manager, mechanical, electrical, electronic and civil/structural engineers, geoscientists, maintenance technicians, mechanical and electrical trades, general operatives, divers and dive support.

Source: Our Ocean Wealth – Background Briefing Document, Part III, Enablers-Getting the Conditions Right for Growth

Appendix 4: National Framework of Qualifications

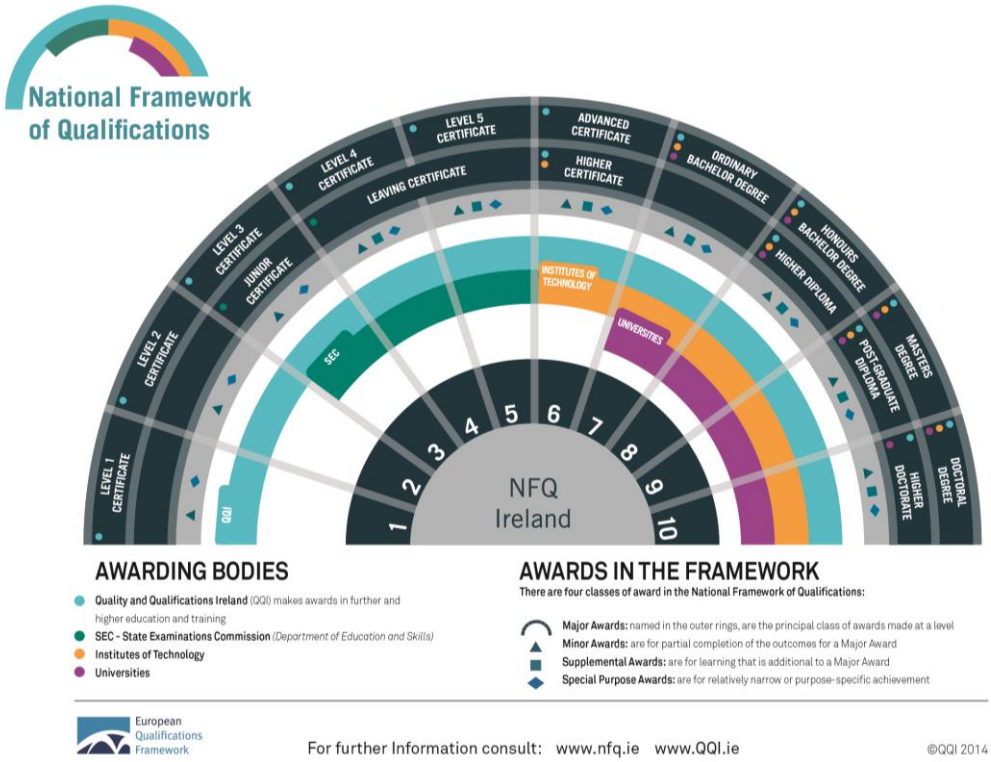
The National Framework of Qualifications (NFQ) is a ten-level system giving an academic or vocational value to qualifications obtained in Ireland. The NFQ levels help indicate how an award can be used for training, education and employment opportunities (see fan diagram). Each level is based on nationally agreed standards of what a learner is expected to know and be able to do after receiving an award.

QQI (Quality and Qualifications Ireland) is Ireland's guardian of the NFQ system. It is a state agency established by the Quality Assurance and Qualifications (Education and Training) Act 2012 with a board appointed by the Minister for Education and Skills. QQI's functions include those previously carried out by the Further Education and Training Awards Council (FETAC); the Higher Education and Training Awards Council (HETAC); the Irish Universities Quality Board (IUQB) and the National Qualifications Authority of Ireland (NQAI). QQI also validates education and training programmes and makes extensive awards in the Further Education and Training sector including in the Education and Training Boards.

NFQ serves several purposes.

- It ensures awards obtained in Ireland are quality-assured and recognised internationally;
- It supports lifelong learning by recognising knowledge and skills within a comparative framework even if they are not recognised by a formal award;
- It provides a system of establishing eligibility in the learning processes for access, transfer and progression
- It recognises awards made by professional bodies (see Qualifications Recognition Service below)

NFQ is linked to similar frameworks in Europe.



Source: www.qqi.ie

Appendix 5: Steering Group Members

Name	Organisation
Brendan Murphy - Chair	President, Cork Institute of Technology (CIT) and EGFSN Member
Peter Heffernan	CEO, Marine Institute
Archie Donovan	Dept. Communication, Energy, and Natural Resources (DCENR)- GSI (Geological Survey of Ireland)
Kevin McCann	DCENR – Petroleum Affairs Division
Yvonne Shields	CEO, Commissioners for Irish Lights (CIL)
Gearóid Mooney	Divisional Manager, Research and Innovation, Enterprise Ireland
John Bolton	IDA Ireland
Meadbh Seoighe	Údarás na Gaeltachta
Conor Mowlds	Head of National Maritime College of Ireland (NMCI)
John McGrath	Head of SLMRU (Skills and Labour Market Research Unit), Solas
Graham Brennan	Programme Manager, Ocean Energy, Sustainable Energy Authority of Ireland (SEAI)
Andrew Parish	Sound and Sea Technology
John Connaughton	Head of Training Services, BIM (Bord Iascaigh Mhara)
Sean O'Donoghue	Federation of Irish Fishermen (Killybegs Fisherman's Organisation (KFO)
Lorcán Ó'Cinnéide	Irish Fish Processors and Exporters Association (IFPEA)
Jan Feenstra	Marine Harvest
Liam Lacey	Director of Irish Maritime Development Office (IMDO)
Glenn Murphy	Irish Shipbrokers
Mary Stack	Fáilte Ireland

Appendix 6: Members of the Expert Group on Future Skills Needs

Name	Organisation
Una Halligan	Chairperson
Marie Bourke	Head of Secretariat and Department Manager, Department of Jobs, Enterprise and Innovation
Inez Bailey	Director, National Adult Literacy Agency
Peter Baldwin	Assistant Secretary, Department of Education and Skills
Ray Bowe	IDA Ireland
John Burke	Department of Public Expenditure and Reform
Liz Carroll	Training and Development Manager, ISME
Ned Costello	Chief Executive, Irish Universities Association
Margaret Cox	Managing Director, I.C.E. Group
Bill Doherty	Executive Vice President, EMEA, Cook Medical
Tony Donohoe	Head of Education, Social and Innovation Policy, IBEC
Bryan Fields	Director, Curriculum Development / Programme Innovation, SOLAS
Joe Hogan	Founder, Chief Technology Officer and VP Openet Labs and IP Management
Declan Hughes	Assistant Secretary, Department of Jobs, Enterprise and Innovation
Colm Mac Fhionnlaoich	Manager CMD and Client Skills, Enterprise Ireland
Deirdre McDonnell	Principal Officer, Department of Education and Skills
Frank Mulvihill	Former President of the Institute of Guidance Counsellors
Brendan Murphy	President, Cork Institute of Technology
Alan Nuzum	CEO, Skillnets
Peter Rigney	Industrial Officer, ICTU
Mary-Liz Trant	Higher Education Authority

Appendix 7: Recent Publications by the Expert Group on Future Skills Needs, 2012 - 2015

Report	Publication Date
The Expert Group on Future Skills Needs Statement of Activity 2014	April 2015
Addressing the Demand for Skills in the Freight Transport, Distribution and Logistics Sector in Ireland 2015 - 2020	February 2015
Guidance for Higher Education Providers on Current and Future Skills Needs of Enterprise: Springboard 2015	February 2015
Regional Labour Markets Bulletin 2014	September 2014
Monitoring Ireland's Skills Supply: Trends in Education and Training Outputs 2014	August 2014
National Skills Bulletin 2014	July 2014
Vacancy Overview 2013	May 2014
Assessing the Demand for Big Data and Analytics Skills, 2013 - 2020	May 2014
The Expert Group on Future Skills Needs Statement of Activity 2013	March 2014
Regional Labour Markets Bulletin 2013	March 2014
Guidance for Higher Education Providers on Current and Future Skills Needs of Enterprise: Springboard 2014	February 2014
Addressing Future Demand for High-Level ICT Skills	November 2013
Monitoring Ireland's Skills Supply: Trends in Education and Training Outputs 2013	July 2013
National Skills Bulletin 2013	July 2013
Future Skills Requirements of the Manufacturing Sector to 2020	April 2013
The Expert Group on Future Skills Needs Statement of Activity 2012	April 2013
Guidance for Higher Education Providers on Current and Future Skills Needs of Enterprise: Springboard 2013	February 2013
Vacancy Overview 2012	February 2013
Regional Labour Markets Bulletin 2012	January 2013
Monitoring Ireland's Skills Supply: Trends in Education and Training Outputs 2012	July 2012
National Skills Bulletin 2012	July 2012
Key Skills for Enterprise to Trade Internationally	June 2012
EGFSN Statement of Activity 2011	April 2012
Vacancy Overview 2011	February 2012
Guidance for Higher Education Providers on Current and Future Skills Needs of Enterprise *(Forfás report based on EGFSN identified future skills needs)*	February 2012
Addressing High-Level ICT Skills Recruitment Needs: Research Findings	January 2012

Expert Group on Future Skills Needs

c/o Department of Jobs, Enterprise and Innovation
Kildare Street
Dublin 2

Tel: +353 1 631 2881
Email: info@skillsireland.ie
Website: www.skillsireland.ie