MARITIMEIRELAND
www.imdo.ie
Irish Maritime Development Office

IRISH PORTS OFFSHORE RENEWABLE ENERGY SERVICES (IPORES)

A Review of Irish Ports Offshore Capability in Relation to Requirements for the Marine Renewable Energy Industry

BY THE IRISH MARITIME DEVELOPMENT OFFICE

IMDO-Ireland
Marine Institute Foras na Mara

Contents

Part IV: Summary Information on some UK and German Ports currently used by the Offshore Renewable Energy Industry 65

IMDO Ireland
Marine Institute Foras na Mara

80 Harcourt Street Dublin 2
Tel: 00353 1 476 6500
imdo@imdo.ie
www.imdo.ie

Research & Editorial

Mr Glenn Murphy
Dr Michael O'Toole
Mr Rory McGuire

Images supplied courtesy of:

BURKE SHIPPING GROUP
SINBAD MARINE SERVICES
DROGHEDA PORT COMPANY
WARRENPOINT PORT COMPANY
PORT OF CORK COMPANY
GALWAY PORT COMPANY
SHANNON FOYNES PORT COMPANY
PORT OF WATERFORD
ROSSLARE-EUROPORT
GREENORE PORT
BELFAST HARBOUR COMMISSIONERS
PORT OF LONDONDERRY
PJ TOBIN CONSULTING ENGINEERS
PORT OF LARNE

Executive Summary

Ireland's offshore renewable energy resources are amongst the highest in the world with a potential of between 63,000 and 73,000 MW of power available from wind, wave and tidal resources. Much of the business in the offshore renewable energy sector over the next decade will focus on installation, operations, maintenance and servicing of offshore wind farms in the Irish Sea, involving an investment of £17 billion by the UK government alone.

Ports will play a key role in facilitating future large-scale developments and operations of ocean energy devices (wind turbines, wave energy converters and tidal turbines). Ports in the United Kingdom are already enjoying increased revenues and net employment gains of over several thousand as a direct result of this activity.

In 2011 an assessment of the Irish ports and shipping requirements for the marine renewable energy industry was undertaken by RPS Consulting on behalf of the Sustainable Energy Authority of Ireland (SEAI) and the Irish Maritime Development Office (IMDO). In January 2012, the IMDO undertook further consultation with the port authorities to address some concerns arising from this report and, importantly, to further develop a picture of areas where Ireland could achieve growth in the short to medium term.

The Irish Ports Offshore Renewable Energy Services (IPORES) report provides an extensive and updated summary of information on port infrastructure, facilities and management plans in relation to meeting requirements for marine renewable energy developers. In total, consultations and analysis are provided on 14 ports on the island. A number of ports in the Republic are identified as having the necessary facilities, infrastructure and hinterland that could support the development of the offshore renewable energy industry. We have consequently identified 3 ports as being Category A, 5 ports as Category B and 3 ports as Category C.

A comparative analysis of some key ports in the UK and Germany currently involved in large-scale commercial offshore wind farms in the Irish Sea and North Sea indicate that dedicated facilities have been provided by the ports with high levels of infrastructure, skills and supporting services.

Port stakeholders expressed concern over the lack of coordination between the industry, government agencies and the ports, as well as the absence of strong leadership at national level in driving the marine renewable energy sector forward.

There was a strong consensus amongst stakeholders that a dedicated website on Irish ports should be established, which could provide a database on port infrastructure, facilities, land banks and strategic plans useful to the developers of offshore renewable energy projects.

The need to update and streamline the current foreshore licensing system and to provide a clear roadmap to investors was highlighted by some port authorities especially in view of the amount of environmental and habitat considerations that need to be addressed in the preparatory work. Ports also wanted to be considered as an integral part in the development of a renewable energy policy, with leadership and clear targets provided. This could be led by the Government's Marine Co-ordination Group, which already brings together many of the respective Government departments with responsibility for regulation, policy and development in this area.

Our report identifies a number of areas where, potentially, several thousand new jobs could be created in the short to medium term, however we feel a more realistic and pragmatic target would be to identify where the first 100 jobs could be created nationally. This would send a clear signal to the markets that Ireland and its ports can deliver the requirements needed for the development of the offshore renewable energy industry.

Recommendations

1. Our report has designated at least 3 ports which we feel meet the minimum criteria to achieve category A status for the offshore renewable services. We recommend that such a policy should be endorsed by the various state agencies and stakeholders.

2. That clear targets are established to deliver new offshore ocean renewable projects at Irish ports. We recommend that a high level Government group oversee a coordinated approach between government agencies, offshore renewable energy developers, port authorities, shipping companies and service providers to effectively deliver and manage an integrated national strategy.

3. We recommend that a national website should be developed as part of any future wider marketing strategy for the IPORES that would integrate information on Irish ports in terms of what they have to offer the offshore renewable energy sector.

4. A more detailed analysis of the jobs created and employment opportunities offered by the offshore renewable energy industry in the UK both at specific ports and through the supply chain would be very useful in terms of future planning for the development of the sector in Ireland. The inclusion of state training bodies or 3rd level institutions should also be considered.

5. A further assessment of government initiatives that have been introduced in competing European windfarm port locations should be undertaken.

6. Financial support and co-operation by other regional or state agencies should be considered by the Government to enhance the attractiveness of ports to potential foreign investors.

7. The foreshore licensing and consent mechanisms needed for upgrading port development, including quay extensions and land reclamation in relation to the facilitation of the offshore renewable energy development, should be streamlined and fast-tracked to address environmental issues to ensure timeframes are met with regard to business development targets.

8. On-going evaluation of the suitability of Irish ports, in the light of new technological developments for wind, wave and tidal power, should be made to ensure capacity can meet the requirements of the industry. This would be particularly relevant in relation to the commercialisation, deployment and servicing of wave energy converters; the up-scaling of offshore wind turbines; and the development of offshore floating wind farms for extreme environments.

Scope and Objectives

The scope of the study was to examine the possibilities for Irish ports to exploit potential opportunities in the offshore marine renewable energy sector. We also wanted to undertake a further consultation process with Irish port authorities to address the feedback highlighted by the Atlantic Ocean Energy Association (AOEA) in relation to the RPS report.

The objectives and goals of the assessment were to:

1. Provide an updated and more comprehensive description of current capacities, infrastructure, facilities and services, ports have to offer the developing offshore renewable energy sector.

2. Determine the level of awareness, strategic planning and marketing by ports in relation to addressing opportunities offered by the developing offshore renewable energy industry.

3. Provide an assessment of the track record of ports in terms of experience with the renewable energy industry.

4. Provide recommendations for broad based categorisation and suitability of Irish ports to meet the requirements of developers in the offshore renewable energy industry based on current infrastructure, facilities and strategic plans.

5. Estimate the potential for job creation arising from offshore renewable energy sector developments, and activities and services provided from Irish ports.

6. Engage with the port authorities for direct feedback and comments on the RPS Report.

Methodologies and Research Methods

Our approach to this report was multifaceted, involving a mixture of techniques and processes. It included extensive desk based research of the subject matter and face to face meetings with senior executives from ports around the entire coastline of Ireland. In order to correspond consistently with the research objectives we also prepared a questionnaire survey to the main ports. This was designed to provide the ports with a secondary opportunity to contribute to a revised assessment of the status of the port sector in ocean renewables – particularly, in terms of their capacities to meet the requirements of developers in addressing the offshore marine renewable energy industry. We created an internal working group which brought together all the experience from within the IMDO in dealing with the Irish ports & shipping services industry which allowed us to use our contacts and collective experience to ensure the industry made a meaningful and open contribution to the report. This enabled us to appreciate and distil the various beliefs, perceptions, and at times, misperceptions of the stakeholder, which arise when the Government or its agents seek to engage in these processes.

Literature review; We completed a comprehensive review of each of the port companies strategic reports, websites, marketing material and relevant government studies. A list of the review and published material is included as a footnote to each port section.

A fundamental aspect of this work was the face to face meetings which were carried out by Dr Michael O'Toole on our behalf. Consultations were held with the following 14 port authorities around the coast of Ireland between January and May 2012. Exploratory meetings were also held with authorities at Ros an Mhíl and Castletownbere Fishery Harbour Centres. However neither port had any track record or future plans to engage with this sector and as such were not considered relevant to the scope of this study.

Each port was appraised with our observations and provided with a final opportunity to engage with any additional comments.

1. Greenore Port
2. Port of Drogheda
3. Dublin Port
4. Arklow Port
5. Rosslare-Europort
6. Port of Waterford
7. Port of Cork / Cork Dockyard
8. Shannon Foynes Port
9. Galway Harbour
10. Killybegs Harbour Centre
11. Port of Londonderry
12. Port of Larne
13. Belfast Harbour / Harland & Wolff
14. Warrenpoint Harbour

PART I

Context

Introduction

In 2011 an assessment of the Irish ports and shipping requirements for the marine renewable energy industry was undertaken by RPS Consulting on behalf of the Sustainable Energy Authority of Ireland (SEAI) and the Irish Maritime Development Organisation (IMDO). The study highlighted the energy potential from offshore wind, wave and tidal resources around Ireland and described the infrastructural resources and specialist vessels needed for developing a typical 300 MW offshore wind farm. We review the comments and feedback from the various stakeholders on the RPS report later in Part II.

Ireland's offshore renewable energy resources are amongst the highest in the world with a potential of between 63,000 and 73,000 MW of power available from wind, wave and tidal resources. It is estimated that during the next twenty years, over 11,000 new offshore wind turbines will be built and installed in UK and Irish territorial waters at a cost of about £100 billion. Given the scale of development planned for the Irish Sea over the next decade, there are clear opportunities for Irish companies and Irish ports to take advantage and profit from the business. This development, if exploited, could result in the creation of hundreds of sustainable jobs in the medium to long term. The underlying potential growth would appear to be consistent with the Governments Action Plan for Jobs as it provides a catalyst to stimulate job creation, economic growth and also potentially important new revenue streams for the ports sector. The Government's recently announced marine integrated plan "Harnessing our Ocean Wealth" also recognises the potential in this area to deliver economic growth and contribute to job creation. Later in this section we provide an assessment of the criteria which we believe underpins the inherent economic and employment potential within the Irish ports sector to maximise this opportunity.

The focus of this report on the Irish Ports Offshore Renewable Energy Sector (IPORES) is firstly to build on the initial results of the RPS 2011 report. We believed at that point that it was necessary to undertake a deeper examination in the context of the current and future plans of Irish ports and the potential they had, if any, to play a role in facilitating future large-scale developments, operations and maintenance of ocean energy devices (wind turbines, wave energy converters and tidal turbines). Commercial seaports, by their nature, are relatively homogenous in their activity, however it would be a mistake to treat all ports as being the same or having the same development potential. Consequently in order to understand what ports provided the most realistic capacity relative to the offshore renewable industry sector, we have categorised each port using a number of strategic assumptions which we feel best describes the ports' development potential.

In Part II and Part III of the report, we provide specific reviews of 10 ports around the coast of the Republic of Ireland and 4 ports around the coast of Northern Ireland. Our analysis indicates that several RoI ports already have some experience working with the offshore energy sector including the oil and gas industry and offshore wind, wave and tidal renewable projects. For example Cork, Galway, Shannon Foynes and Killybegs all have experience in handling specialised survey, support and supply vessels; and heavy equipment and drilling supplies for oil and gas exploration. Many of the ports have handled, loaded and stored wind turbines at harbour sites e.g. Killybegs, Shannon-Foynes, Cork, Waterford, Rosslare-Europort, Arklow, Dublin, Belfast Harbour / Harland & Wolff and Londonderry. Other ports have experience docking and loading up jack-up vessels with wind turbines (Belfast Harbour, Cork, Dublin, Rosslare-Europort and Arklow), whereas construction, R&D and heavy lifts associated with wave and tidal energy generating devices, have been completed by Belfast Harbour /Harland &Wolff, Greenore, Port of Cork and Galway Harbour.

Ports were provisionally categorised into three types according to various criteria and requirements by offshore renewable energy developers. These classifications are intended to serve as guidelines only and can be revised at a later date depending on further strategic developments and investments in port facilities and infrastructure.

In Part IV, we also review, by comparison, some of the initiatives being undertaken by key ports in Great Britain and Germany and how they have positioned themselves to take advantage of the market opportunities to provide the demand for services and operations to the offshore sector. An analysis of job creation, in relation to offshore wind farm developments, and operations and maintenance bases, indicate that there has already been considerable job creation across a number of sectors. This has been dependent on the scale and nature of the offshore developments. By moving quickly in line with the market demand in the UK ports, they have focused their competitive advantage in constructing and servicing the offshore marine renewable energy industry and in the process generated thousands of new sustainable jobs.

Our report concludes with a review of the main findings from our meetings and appraisal of the IPORES market. We set out a framework which we feel can be used as a guide to progress work in this area by the Government and its agents. Some recommendations are put forward as a result of surveys and subsequent analysis that may assist a future national strategy with regard to ports and the offshore renewable energy sector. Finally we reflect on the feedback provided by the port stakeholders under a number of areas relating to policy approach, communication and information sharing, and barriers to development. Overall the general consensus in this report is positively disposed as to the potential for investment in the marine offshore and renewable industries, which, if exploited, will lead to new job growth and contribute to economic recovery.

Selection & Categorisation of Irish Ports for Offshore Renewable Energy Services.

Our initial port selection was based on characteristics which we deemed as being a minimum requirement to service the offshore renewable energy sector.

The ports were initially selected based on the following basic criteria:

1. Port infrastructure, facilities and available quay space and hinterland.
2. Depth of water available.
3. Past experience with the renewable energy and/or offshore energy sectors.
4. Proximity to markets.
5. Potential for job creation.
6. Local skills available including technical, engineering, shipbuilding / repair and maritime support services.

CATEGORY A	CATEGORY B	CATEGORY C
High Potential Sites, large scale sites.	Medium scale projects	Lower development.
Large employment.	Largely service and supply focused.	Tertiary to market.
Near to market.		May gain from overflow factors.

Having selected the basic criteria above, we felt that most ports would have the ability to meet some or many of the assumed fundamentals. However, it was also necessary to qualify these criteria into the following three categories based on their ability to meet the requirements of offshore renewable energy developers together with a number of other key factors.

The categorisation of the ports is intended to serve only as a guideline to support broad-based decision making. Other factors will also need to be taken into consideration by developers such as scope for port/public-private partnerships, and possibly other issues such as access to research and development facilities.

Category A: Large scale construction, assembly and service ports

We felt that for a port to reach a Category A status that they would need to be in a position to meet almost all the criteria which large foreign investors were likely to seek from a site location:

1. Ports which could offer high potential to serve as regional centres or hubs for large-scale developments such as construction, fabrication, assembly or installation of offshore wind farm as well as the production and installation of commercial arrays of wave and tidal energy devices.

2. Available hinterland that was ready or near to market development within a 1-3 year timeframe. Such sites might already be brown field or used for industrial related activities.

3. Ports that have previous experience with the offshore energy sectors and most of the basic necessary criteria required by developers such as suitable infrastructure, facilities, quay length, depth, re-enforced quay areas and land availability.

4. There would also be a skilled workforce available nearby with potential for further job creation in the region of 100-300 jobs upwards.

5. Distance from these ports to current markets in the Irish Sea would range from 50 to 200km.

6. These ports would have a clearly defined strategy for marketing their facilities to offshore renewable energy developers with contacts to multinational companies already established.

7. Ports ability to make investment to upgrade existing facilities and provide a dedicated base to support and service offshore renewable energy operations.

8. Presence of other international companies in transport, logistics, energy, construction and pharmaceutical industries.

9. Proactive strategy to market the port or facility to offshore renewable energy sector.

10. Proximity to centres of excellence in research and development including universities and technical colleges.

Category B: Strategic support operations and maintenance ports

We believe that Category B ports have an important role to play in servicing future offshore demand but would probably not have the same scope to handle in the short term a large scale investment given natural hinterland or other constraints.

1. Ports that have some potential to serve as an operations and maintenance base for the offshore renewable energy sector but may currently have limitations in terms of depth, quay length, set-down space and hinterland.

2. Most of these ports could accommodate specialised vessels such as jack-up barges but would be unable to support large-scale operations.

3. Some experience with importing wind turbines and some practical experience with offshore energy sector.

4. Distance to markets would vary from 50 to 200 km with the economic viability of operations depending on how close the offshore wind farms are located to the port. Some strategic planning in relation to offshore renewable energy sector including some provisional contact with developers.

5. Some job creation 50-100 potential possible depending on level of operations by offshore wind farm developers and expansion work regarding existing facilities to cater for requirements of the sector.

6. Skilled workforce available.

Category C: Service ports

We deemed the ports in this sector, while meeting the initial selection criteria, do not have any immediate plans to expand or develop into the IPORES areas. Any job growth would be very niche orientated and limited to small local service providers in the initial phases.

1. Ports that have limited potential to engage with the offshore renewable energy sector due to insufficient infrastructure and facilities, inadequate water depth and/or restrictions in terms of land availability.

2. Ports with no defined strategies in place to engage with the offshore renewable energy sector. However, part of the ports' facilities could be used by specialised vessels and barges to provide some services to offshore wind or wave energy farms should they be located nearby.

3. The availability of skilled labour, engineers and technicians could also be limiting if the post is located away from the main population centres.

A list of the ports and persons visited are given in Annex 1.

Employment Potential

In February 2012 the Government published its Action Plan for Jobs. Our report also considered the potential that new projects connected to IPORES could deliver in the near to medium term. It is our opinion that job creation would be significantly improved in Ireland if foreign investors could be attracted to establish construction and fabrication facilities for wind turbines, and concrete/steel foundations and assembly hubs for the installation of offshore wind farms. In the longer term, with the commercialisation and installation of wave and tidal energy devices in Irish waters, further job creation could be expected depending on the scale of offshore operations planned.

Our analysis indicates that job creation could be in a variety of sectors, skills, services and professions and could include: construction work and engineering (mechanical and electrical); specialised technicians, stevedoring and services of specialised vessels (catamarans, jack-up barges, cable-laying and survey vessels); steel and concrete fabrication; boat-building; specialised companies associated with servicing and maintaining wind turbines, renewable energy equipment and components; and ship repair, bunkering, shipping agents and chandlery. In a case where a multinational company established manufacturing facilities at an Irish port for the large scale production, construction and fabrication of wind turbines, towers, specialised components and the associated steel/concrete foundation structures, much higher levels of employment would result with the possible creation of up to 1200 jobs in the vicinity of a major port and regional hub. In the UK we have seen several tangible examples of how these projects have contributed to substantial job creation opportunities.

We believe the main caveats to this future industry development will be the ability to attract major international companies to invest in Ireland. This in turn is likely to be dependent on the provision of local or regional incentives, necessary up-grade of port facilities and importantly the application of an effective and efficient consent regime for site planning and licensing.

RPS Consulting similarly estimated that the operations and maintenance work involved in servicing 150 turbines on an offshore wind farm could create about 100 full time jobs. These would involve a range of companies within the operation and maintenance (O&M) supply chain and would include vessels services, water and fuel, technical inputs, and loading and unloading of project cargoes.

A recent assessment by the Centre of Economic and Business Research in Britain (2012) found that the UK offshore wind sector alone could create up to 45,000 jobs by 2015 and close to 100,000 jobs by 2020. We have provided a brief analysis of job creation estimates, from the construction of a number of offshore windfarms and the establishment of dedicated port facilities in the UK and Germany to service these developments. These are indicated as follows:

- **Belfast Harbour / DONG Energy:** construction and operation of wind turbine assembly and installation hub: operations and maintenance (O&M): up to 300 long term jobs, of which 150 are involved in construction

- **Port of Mostyn:** Gwynt y Mor offshore wind farm – 576MW (Wales): 100 long term skilled engineering and technical jobs – 120 construction jobs

- **Port of Barrow-in-Furness:** West of Duddon Sands offshore wind farm – 389MW (SW England): 60 long term jobs in engineering, technical and construction

- **Able Humber Port:** Offshore Windfarm Hub for North Sea servicing a number of offshore wind farms: fabrication, construction and installation: integration of supply chain, skills, infrastructure and facilities; construction of Marine Energy and Business Park: 3000 short to medium term jobs in a variety of marine and land based companies including foreshore property developments.

- **Port of Cuxhaven:** Construction and operation of dedicated port site to service offshore wind energy industry; construction, fabrication, of turbines, towers and foundations; integration of supply chain: 1,700 to 2000 jobs (2012) to increase to 3000 jobs by 2015.

Based on the existing information available from various sources, we have attempted to compile some estimates of jobs potential associated with offshore renewable energy sector activities at the various Irish ports over the next 5 to 15 years (Table 1).

The estimates are intended as guidelines only and assume that offshore renewable energy developers are attracted to Ireland and that port facilities can be expanded and restructured in order to meet the needs of the industry. To meet these employment estimates, a few key ports would need to be involved in relatively large-scale developments i.e. assembly and installation operations of offshore windfarms as well as servicing and maintenance.

TABLE 1.
POTENTIAL JOB CREATION AT IRISH PORTS FROM OFFSHORE RENEWABLE ENERGY SECTOR: CATEGORY A&B PORTS SECTOR OVER SHORT, MEDIUM AND LONG TERM

Port / Harbour	Jobs > 5 years	Jobs 5 -10 years	Jobs 10 -15 years
	2012 – 2016	2017 – 2021	2022 – 2026
Category A			
Dublin Port	150 – 200	200 – 300	300 – 1000
Port of Cork	150 – 200	200 – 500	500 – 2000
Shannon-Foynes	25 – 100	100 – 300	300 – 800
Sub-Total	325 – 500	500 – 1100	1100 – 3800
Category B			
Killybegs	10 – 25	25 – 100	100 – 200
Rosslare-Europort	10 – 25	25 – 50	50 – 100
Port of Waterford	10 – 25	25 – 50	50 – 100
Galway Harbour	10 – 25	25 – 100	100 – 200
Sub-Total	40 – 100	100 – 300	300 – 600
TOTAL	**365 – 600**	**600 – 1400**	**1400 – 4400**

Strategic Plans

Several ports have strategic plans for harbour developments in place to address expansion of their core activities, i.e. Galway Harbour, Dublin Port, Shannon-Foynes and the Port of Cork. Most of these developments are focused on the ports core acitivities but also include the cruise liner / marine tourism industry and the need for new berthing facilities with deeper waters.

Opportunities in the offshore renewable energy and marine technology / R&D sector are highlighted in some of the port development plans and brochures. It is likely that further investment will be required to generate specific infrastructure and facilities to attract developers and maritime businesses. The timelines for some of these developments are more likely to be in the medium to long term before the capacity or infrastructure could be delivered.

For example, Port of Cork (Cork Dockyard / Ringaskiddy) plans to create an international energy hub for the offshore renewable energy sector involving the fabrication and assembly of wind turbines for both deployment in Irish and UK waters and for export.

Galway Harbour view the opportunities arising from future renewable ocean energy developments as being important and are prepared to improve existing facilities to attract developers. It has plans for extensive port developments including a marine technology and wave energy business park.

Dublin Port has identified the offshore wind energy sector in the Irish Sea as a growth area and is prepared to invest in the necessary infrastructure if developers can be attracted to use the port as a logistics base.

Shannon Foynes views the marine renewable energy sector as very important in terms of future port activity and job creation. The port has plans to extend the existing quay and make additional land available to the east of the port. It also has plans for a deep water multipurpose harbour site on Foynes Island which could service future renewable energy projects and enterprises off the south west and west coast.

Killybegs Harbour Centre anticipates the business arising from the offshore renewable energy sector as vital for the future of Killybegs and would consider expanding the existing facilities and make more hinterland available for future development if the needs arise.

Belfast Harbour / Harland and Wolff are currently developing a £50 million offshore renewable energy hub with DONG Energy. It is expected that this facility (to be completed end of 2012) will be a major operating centre for assembly and installation of wind turbines in the Irish Sea.

PART II

Review of Irish Ports and Harbours

Overview of Irish Ports Assessment

The following section has been compiled based on discussions held with the various port authorities in responses to the questionnaire. Some information has also been used from the RPS report and analysis. The ports in the Republic of Ireland and Northern Ireland are analysed separately with the results presented in two sections. The information collected was assessed and presented under the headings: Background, Port Infrastructure and Facilities, Offshore Energy Sector, RPS Report, Future Strategies for Port Development, Information and Conclusions. A synthesis of the port reports are summarised in Table 2-3. The main findings, conclusions and recommendations are presented at the end of the report.

The first series of consultations took place between 18 -24 January 2012 during which three ports were visited and consultations held with Shannon-Foynes Port Company, the Galway Harbour Company, the Killybegs Harbour Centre The second series of consultations were held between 13th February and 3rd March, with the Ports of Cork, Greenore and Port of Drogheda being visited. The third series of consultations took place between March 14th and April 19th and included Arklow, Port of Waterford, Warrenpoint, Port of Larne, Londonderry Port, Belfast Harbour / Harland &Wolff and Dublin Port.

This report was undertaken at a time when significant developments and advances in offshore renewable energy were already underway in Northern Ireland. These include the release of a government strategic plan for offshore renewable (2012-2020), a new licensing round by Crown Estates for Northern Ireland waters and the construction of a 50 acre dedicated site as a pre-assembly and installation hub for windfarms at Belfast Harbour. This port site (D1) in partnership with DONG Energy is to cost £50 million and will be operational by early 2013. This state of the art facility will have open access to most offshore windfarm in the Irish Sea and is expected to be actively involved with present and planned operations off the coasts of Scotland, England and Wales.

Four ports in the UK (Mostyn, Barrow-in –Furness, Ramsgate and Able Humber) and one in Germany (Cuxhaven) were assessed in a similar manner to compare with infrastructure and facilities of ports around Ireland (see Table 4). These ports currently serve as major hubs and logistics centres for large windfarms developments and thus provide interesting comparisons with those in Ireland.

The RPS Report 2011

In the RPS Report "Assessment of the Irish Ports and Shipping Requirements for the Marine Renewable Energy Industry (2011), a useful account was given of the existing infrastructure, facilities and strategic plans of various ports around the Irish coast in meeting requirements on marine renewable energy developers. Summary information was provided under the following headings:

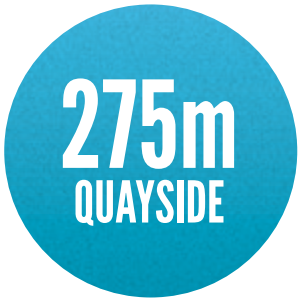
- Proximity to main test beds and offshore installation sites
- General port infrastructure, quayside availability, storage & Hinterland access
- Suitability to facilitate renewable development
- Previous experience in the offshore sector
- Future strategy for developing and supporting ocean energy

A key part of the assessment was a review of the current status of Irish ports and their ability to meet the requirements of the marine renewable energy developers. The analysis also included an evaluation of Irish port's experience with the offshore energy industry and current levels of strategic planning in relation to the sector. The report concluded that even the largest of Irish ports would not currently be in a position to accommodate offshore windfarm construction and installation activities of the scale anticipated without some reorganisation of existing operations and the development of new facilities. Major constraints for ports were the inability to provide the necessary land areas required and insufficient water depth and quayside berths.

The RPS Report was generally well received. However, some port authorities were critical of the fact that the information focused primarily on the development potential of offshore wind energy in the Irish Sea and the opportunities for east coast ports. Little attention was given to the advantages of south and west coast ports especially in relation to the future potential of wave energy developments and offshore floating wind farms designed to operate in more extreme conditions. Although, the commercial development of renewable energy from wave and offshore floating wind farms are still several years away, the hugh resource available off the west coast offers significant development and employment potential for the region in the long-term. Comments by the port authorities on the RPS Report were coordinated by the Atlantic Ocean Energy Alliance (AOEA) which comprised mainly of issues raised by the ports of Port of Cork, Shannon Foynes, Galway and Killybegs. The AOEA concluded that a more balanced assessment of the current status of Irish ports and infrastructure was needed to provide a more accurate reflection of their real potential to meet the future requirements of the offshore renewable energy sector.

In response to the comments on the RPS Report, the IMDO undertook to follow-up with a second stakeholder's consultation process with the Irish port authorities to obtain additional inputs and feedback and to clarify their positions in terms of meeting current and future criteria and requirements by marine renewable energy developers. A part of this exercise was the collection of further information from the ports through the completion of a questionnaire. A further examination, including comments attributed to respective ports concerning the study have been include in this report.

Greenore Port



Background

Greenore Port is located at the eastern end of the Carlingford Peninsula next to the important Dublin – Belfast economic corridor. The port owner is Greenore Ferry Services Limited who coordinate all activities within the harbour (Figure 1). It has three berths and can handle vessels of up to 39,000 DWT.

Greenore main business currently comprised predominantly of bulk steel, animal feed, and timber. The Port was formerly and important centre for exporting of live cattle. The Port has plans to develop a Ro-Ro and Lo-Lo facility at the port in the coming years which will require significant infrastructure and quay extension development.

Greenore is situated on the south side of Carlingford Lough and is close to UK wind farm sites planned for the northern Irish Sea. The Port would also be well placed to service sites planned for the east coast of Ireland. However, the approach channel to the port is narrow (about 95m) and limited by depth with 6.3m at low tide. Anchorage of the port is good in waters of 15-22m in holding ground of fine sand.

The investment company One51 which is one of the owners of Greenore Port is also shareholders in OpenHydro, an Irish tidal turbine company that has its main offices and fabrication facilities based at Greenore. OpenHydro has developed one of the world's first tidal turbines which have been deployed for testing and operation at some of best sites globally i.e. Puget Sound, Bay of Fundy, Brittany and Pentland Firth. It plans to expand its production facilities at Greenore.

Port Infrastructure and Facilities

Greenore has approximately 275m of quayside space comprising three berths which have water depths ranging from 4.2 to 8.0 m at low water. Its port lay-down space area is relatively confined but there is more substantial hinterland available close-by.

It has mobile and fixed craneage available at the port with a capacity of up to 100t. The current 40t gantry crane is now obsolete. It has pilotage, tugboats and communications available with a number of large warehouses at the facility including one dedicated to the ocean energy company OpenHydro Ltd.

Infrastructure development is required to extend the existing quay and provide better facilities at the port.

The road access to the port is good and reasonably close to the main Dublin – Belfast motorway.

FIGURE 1. AERIAL VIEW OF GREENORE PORT.

Greenore Port and the Offshore Energy Sector

Greenore Port is already involved with the marine renewable energy industry and is the home base of OpenHydro which manufactured tidal turbines. The Port handles the lifting of the heavy turbines onto vessels and will be involved in the overhaul and maintenance of turbines which are undergoing testing at various European sites including Scotland.

Greenore also imported oil from coastal tankers and operated a tank farm at the port up until recently.

The port has not been involved in the offshore oil exploration and production sector or in the offshore windfarm developments in the Irish Sea. At present, there is no strategy in place to seek develop business opportunities associated with the offshore wind energy sector in the Irish Sea.

Future Strategy – Offshore Renewable Energy Sector

Greenore Port plan to upgrade its infrastructure over the next few years and expand its present facilities. Part of the plan includes the extension of the quay to a total length of 300m which will involve a re-furbishing of the quay wall and a 50m extension as well as some reclaiming of land. Greenore could have a future role to play in the renewable energy sector particularly if plans for the new facility materialise. However, the sector is not viewed as part of the port's core business and there is no marketing strategy in place for future developments. Although Greenore Port is close to offshore windfarms in the Irish Sea, its usefulness as a service base is limited by insufficient quay space available and possible draft issues for larger craft.

Information

No website is available for the Port of Greenore but management stated that they were in the process of preparing one and expected it to be up and running later this year.

Conclusions

Although the Port of Greenore is strategically positioned close to existing and planned offshore wind farm developments in the Irish Sea (between 10 and 120 km) it has limited facilities, depth, space and infrastructure to offer for large scale offshore renewable energy i.e. wind and tidal. The port currently hosts a tidal turbine manufacturing company OpenHydro but management does not view the offshore wind sector as a potential for core business. However, future development and expansion of the port with more extensive land banks could offer better facilities and support to service the marine renewable energy industry.

THE PORT OF GREENORE HAS BEEN GIVEN A **CATEGORY C** IN THIS PRELIMINARY ASSESSMENT.

Drogheda Port

Background

1.5m
TONNES OF CARGO

Drogheda Port is situated on the east coast of Ireland on the historic River Boyne and has direct access close-by to both Dublin and Belfast on the M1 motorway. The Port has geographic advantages for transport links onto and out of Ireland and has links with Europe, Scandinavia and the Baltic States. It is also close to proposed Irish Sea windfarm locations. It handles up to 700 vessels annually and up to 1.5 million tonnes of cargo. A wide range of customers and trades use the port which has the ability to handle most types of cargo. Imports include containers, paper, timber, fertiliser, grain, petroleum and LPG whereas exports range from zinc concentrate, magnesite to timber and containers.

Port Infrastructure and Facilities

VESSELS UP TO
130m
ACCOMMODATED

The Drogheda Port Company has two facilities for the loading and discharging of cargoes – the inner north quays port and the deep-water facility at Tom Roes Point Terminal. There are also two private facilities along the river bank.

The approach and estuary channel to the deep water facility at Tom Roes Point which is about 5 km from the sea is dredged to a depth of 2.2m Chart Datum (CD). Waters at the inner port which is 7 km from the sea are kept at depths of 2.2m CD. The port can currently accommodate vessels up to 130m in length and 7,000 tonnes cargo deadweight.

12
ACRES OF OPEN
STORAGE FACILITIES

The berth at Tom Roes Point is 160m in length and is the primary location for the handling of containers, timber and general cargo (Figure 2). Two hundred and ten meters (210m) alongside this quay has been dredged to a depth of 5.5m to accommodate vessels. There are open storage facilities behind the quay of about 84,000 m2 (12 acres). Craneage is operated by two large Liebherr mobile cranes (64t) and a number of tracked grabbing cranes. Larger project lifts can be handled on an individual case by case basis.

The inner north quay port (Town) is a general cargo facility catering mainly for bulk grain, steel and timber. It has berths for 4 vessels along a 430m long quay. Cargo handling at the inner port is handles by a combination of harbour mobile cranes (90t) and crawler cranes with supporting fork-lifts. There is a significant area behind the Town quay of about 10,000m2.

The private facilities include a hydrocarbon docking area which can accommodate vessels up to 100m in length in a dredged pocket of 3.0m CD and a bulk cement, magnesite and coal loading area which can cater for two vessels on a 160m long berth.

Good stevedoring, craneage, maritime services, pilotage and work boats available to support port activity with the harbour masters office and administration located on the south shore.

FIGURE 2. DROGHEDA PORT – TOM ROES TERMINAL.

Drogheda Port and the Offshore Energy Sector

The port has no previous experience with the offshore energy sector. It has limited facilities to act as a location for the assembly and deployment of windfarms in the Irish Sea largely due to depth restrictions and the fact that a substantial land-bank would be required. It has some potential to act as a servicing centre should turbine clusters be located along the north east coast within suitable range of the port. Drogheda port intends to concentrate on its current core activities and has no plans to be directly involved in the marine renewable energy sector except possibly through its Bremore Port Development Plan.

Future Strategy – Offshore Renewable Energy Sector

Drogheda port has no immediate plans or marketing strategy for the development or expansion of its existing facilities and infrastructure to cater for offshore wind energy developments in the Irish Sea. However, Drogheda Port Company has ambitious plans as a promoter for the development of a new deep water port at Bremore, close to Balbriggan in Co. Dublin (see section on Bremore Ireland Port).

Information

Website on the Port of Drogheda which includes details of its commercial activities, movement of vessels, corporate portfolio and services available, see: www.droghedaport.ie

Conclusions

The Port of Drogheda is unsuitable as a centre for the assembly, construction and installation of offshore wind turbines for the Irish Sea. Its access is also restricted due to shallow water depth in the channel. However, the port could be suitable as a location for servicing and maintenance offshore facilities especially given that the port located between 30 and 100km from existing and planned wind farms and potential tidal sites in the Irish Sea. The Port has no plans to expand infrastructure or facilities to cater for the offshore renewable energy sector and has no strategy in place to market the port in this regard.

THE PORT OF DROGHEDA HAS BEEN GIVEN A **CATEGORY C** IN TERMS OF THIS ASSESSMENT.

BREMORE
IRELAND PORT

Bremore Ireland Port – Proposed New Development

24
HOUR A DAY
MARINE ACCESS

700m
LINEAR QUAY

10
MILLION
TONNES ANNUALLY

Background

Drogheda Port Company have a proposal to develop a world class deep water port, logistic centre and business park away from the congested hub of Dublin City and the restricted conditions of Drogheda Port (Figure 3). The proposed site is just north of Balbriggan within the greater Dublin area, rail linked and adjacent to the M1 motorway. Plans for the new port indicate that it will have a 24 hour a day marine access with facilities to accommodate new short sea shipping services to the UK, Europe, Scandinavia and the Baltic States which would include Lo-Lo, Ro-Ro and passenger traffic. Bremore would have the deepest berths available on the east coast of Ireland.

The development of the proposal for Bremore Ireland Port was begun in 2002 by Drogheda Port Company as a strategic response to an expected future deficit in port capacity not only in Drogheda Port but also along the east coast of Ireland as a whole. The estimated cost to develop the Phase 1 of this new deep water port is in excess of €300 million. Bremore Ireland Port will have a strategic and development plan for offshore renewable energy especially the wind-sector and key business opportunities will be pursued with developers in relation to Bremore's potential for supporting construction, operation and maintenance activities.

It is proposed to develop the project in three phases with the first phase about 700m of linear quay for container and general cargo handling, two Ro-Ro and one high speed ferry berth for road freight, car and foot passenger traffic. The depth alongside the quay will be up to 10.5m CD with a potential for a future deepening of 12.0m. There will be extensive land areas adjacent to quays for storage and lay-down. The port will be designed to cater for up to 10 million tonnes of freight annually in Phase 1.

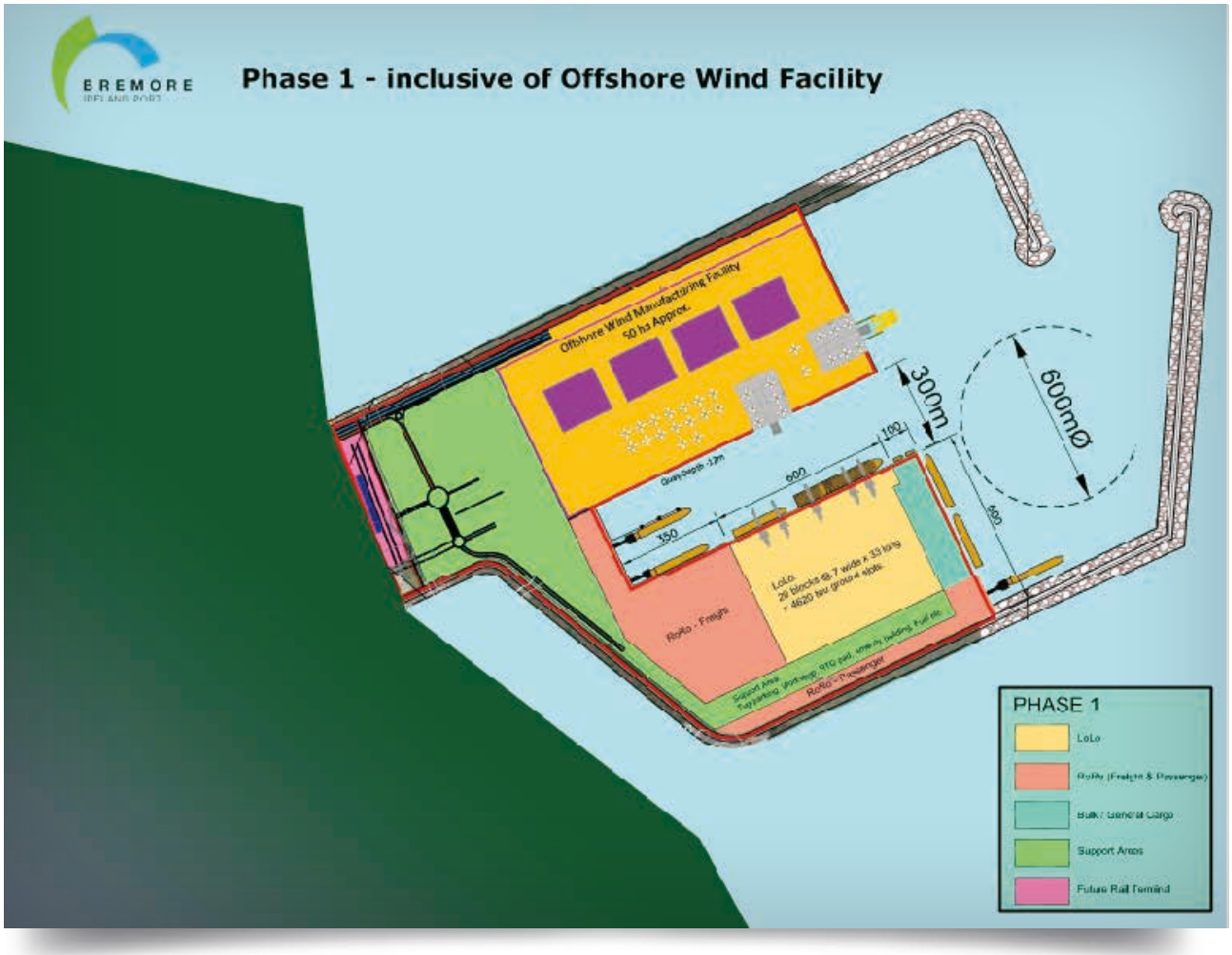


FIGURE 3. SCHEMATIC DIAGRAM OF PHASE 1 OF BREMORE IRELAND PORT DEVELOPMENT PLAN SHOWING EXCLUSIVE OFFSHORE WIND FACILITY.

Although Bremore Ireland Port has not actively marketed its potential as a wind turbine manufacturing and servicing centre, it has been approached by a number of multinational companies that manufacture components for offshore wind farms. In the case of one company, it confirmed that it would locate a substantial facility at Bremore in the event of securing orders for windfarms in the Irish Sea.

Should the planning permission and foreshore license be approved and development of the Bremore Ireland Port take place, it is expected that it would take 3 to 5 years before full commercial operations could commence. The port would then be in a strategic position to provide the required capabilities and facilities required by Irish and UK windfarm developers. It is most likely that specialised port sites would be leased out to developers on a 20 year lease basis.

Conclusions

The proposed new Bremore Ireland Port (if developed) would provide a deepwater facility for a range of cargo types with access to extensive hinterland. It would include a state of the art facilities and infrastructure to support construction, operations and maintenance activities associated with large scale developments of wind farms and tidal energy arrays in the Irish Sea. Bremore Ireland Port would be an attractive location as key marine renewable energy hub and strategically positioned for both Irish and UK offshore windfarms. It would be within 30 to 120 km of existing and planned operations and would provide all of the facilities required by developers and manufacturers. If constructed and operational today it would be classified as a Category A port in terms of meeting the requirements of the offshore wind energy sector. However we no rating is applied in the current context.

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

Dublin Port

50%
OF TOTAL IRISH
IMPORTS & EXPORTS

1.2
MILLION
TOURISTS/PASSENGERS
ANNUALLY

28
MILLION TONNES
THROUGHPUT

Background

Dublin Port is located along either side of the River Liffey out to the mouth of the estuary. Much of the port (205 hectares) is located on the north side and lies at the end of East Wall and North Wall from Alexandra Quay. The part of Dublin port on the south side of the river is much smaller (51 hectares) and lies at the beginning of the Pigeon House peninsula. The Port is multi-modal and as such handles unitised cargo, liquid bulk, dry bulk, cruise liners and to a lesser extent break bulk and new cars. It handles over two-thirds of containerised trade to and from Ireland and 50% of all total imports and exports. In 2011, it had a total throughput of approximately 28 million tonnes.

The main activity of the port is freight handling and accommodates a wide range of vessels from large container carriers to small coasters visiting daily. It also handles over 1.2 million tourists / passengers annually through the ferry companies operating at the port. Ro-Ro ferry services run regularly across the Irish Sea to Holyhead in Wales and Liverpool in England and in the summer months to Douglas in the Isle of Man. Unitised cargo trade in Dublin Port in 2010 amounted to 81% of the total tonnage of which Ro-Ro accounted for over 60% of the total.

Lo-Lo trade is managed at three separate port terminals and account for 20% of the port's total throughput with about 550,000 TEU's handled in 2010. They are operated by Dublin Ferryport Terminals, Marine Terminals Ltd and Common User Terminal and have daily services linking UK and mainland Europe as well as the Mediterranean. The Port provides facilities for dry bulk and caters mainly for loading and discharging of lead and zinc concentrates, peat, coal, grain and animal feedstuffs. Dublin Port also has discharging facilities for oil, bitumen, chemicals, liquid petroleum gases and molasses and has large storage facilities at a 41 hectare site.

Dublin Port is also a docking area for cruise liners and catered for about 90 cruise ships and over 95,000 passengers and crew in 2011.

FIGURE 4. UNLOADING WIND TURBINE TOWERS AT DUBLIN PORT.

Infrastructure and Facilities

The Port of Dublin has extensive areas of quayside and storage with jetties available at the Alexandra Basin, Ocean Pier and South Deepwater Quay that are used for project cargo. The jetty at Alexandra Basin is used mainly for dry bulk and is 247m long with water depths of between 9 and 10m LAT. Alexandra Quay has two berths – the west quay is 360m with water depths of 9.6 to 10.2m LAT while the east quay is 360m long and has an available water depth of 9.6 to 10.3m LAT. There are also two berths in the Ocean Pier area - the western quay is 410m long with water depths of 9.5m LAT and the eastern quay is 240m and has an available water depth of 9.7m LAT. There is a potential storage area behind the western quay which could be available for developers. The South Quay is currently used for the handling of dry bulk and is 357m long with an available water depth of 11m LAT. There is an open quay area available of approximately 42,500 m2.

Harbour-mobile cranes are available including three 64t and two 104t mobile cranes located at Alexandra Quays as well as two mobile cranes (64t and 84t) which serves the South Deepwater Quay. In the past, the port has handled heavy lifts of up to 200t.

The Port Company operates two tugs (water tractor-types) with bollard pull of 54t each.

Road access to Dublin Port is good and the Dublin Port Tunnel provides a direct link to the national road network.

Dublin Port and the Offshore Energy Sector

Dublin Port has limited experience with the offshore energy sector although it has the potential capacity to provide much of the facilities, infrastructure and services that would be required by developers in the offshore renewable energy sector. The ports position adjacent to windfarm sites along the east coast of Ireland (Oriel, Dublin Bay, Codling Bank and Arklow Bank) and is also relatively close to large existing and planned UK windfarms in the Irish Sea such as Burba Bank, Rhyn Flats, Gwynt y Mor and Walney 1&2. The extensive facilities and land available within the port makes it a very suitable location as an operational base to support the assembly and installation of windfarm towers and turbines. In the past, the port has handled the importation of wind turbines and renewable energy equipment for land-based windfarms (Figure 4).

Future Strategy – Offshore Renewable Energy Sector

Dublin Port views the offshore windfarm industry as a potential significant source of business in the future although no specific strategy has been developed yet to market the port as an attractive facility to developers. It has identified existing lands along the south part of the port that could be made available for the storage, marshalling and assembly of wind turbines. It can also re-organise existing operations in order to free up adjacent quay space for the use by developers should the opportunity arise in the short term. If suitable business opportunities arose, the port would consider the construction of new facilities to support specific developer's requirements in relation to offshore windfarms. The Port Company has experience in obtaining the necessary planning permissions and has the financial resources needed for developments which could be made available within a relatively short time.

Information

A comprehensive description of the activities, infrastructure, facilities and services of Dublin Port is given on the company's website. The proposals to deliver new capacity for the port, re-configure existing facilities and intensify land use with the port are described in the MasterPlan (2012-2040). Dublin Port website: www.dublinport.ie Dublin Port Company: MasterPlan 2012 – 2040 www.dublinport.ie/masterplan

Conclusions

Dublin Port is strategically placed to take advantage of development potential arising from offshore windfarms and other renewable energy technologies e.g. tidal turbine arrays located in the Irish Sea. It is located within 60km of windfarm sites along the east coast and also close to major windfarm developments off England and Wales (within 150km). The Port views the offshore wind energy industry as a potential source of future business and has a wide range of facilities that would make the port attractive to offshore renewable energy developers. The Company can make available specific areas for storage, marshalling and assembly of wind turbines and can re-organise existing operation to meet developers' requirements. Dublin Port has also indicated that funding could be made available to construct specific facilities for supporting the sector. However, such developments may require planning permission or foreshore approval.

DUBLIN PORT CAN BE CLASSIFIED AS **CATEGORY A** PORT IN TERMS OF THIS ASSESSMENT.

Arklow Port

55KM
SOUTH OF DUBLIN
AND NORTH OF ROSSLARE

SKILLED
LOCAL LABOUR FORCE

37
CARGO SHIPS
"ARKLOW SHIPPING"

Background

Arklow town and port are located in the south of Co. Wicklow at the mouth of the Avoca River. The town is situated on the main Belfast- Dublin-Rosslare motorway 55 km to the south of Dublin and north of Rosslare with good rail connections.

The port is relatively small but has a skilled local labour and services to support small coastal shipping operations, yachting and a local inshore whelk fishing industry.

In the past, the port of Arklow was an important centre of commercial activity with significant quantities of bulk and general cargo as well as sulphate of ammonia, animal feed, coal and fuel oil being imported. In recent years, the level of port activities has declined due to the closure of the N.E.T. fertiliser plant, competition from other ports and a fall off in landings from inshore fisheries.

Infrastructure and Facilities

The Port of Arklow has currently four berths 80m long with a depth of 4.0m at mean low water springs (MLWS). It can accommodate a variety of vessels up to 2,600 DWT including coasters, small tankers, dredgers, beam trawlers and various offshore service vessels. Recent visitors included the Celtic Explorer and a number of Irish Navy vessels. There is a small fishing harbour with up to 30 small vessels (30-40 foot) mainly fishing whelks.

There is limited quay space available to the port although some land (a few acres) is owned by the port near the derelict industrial site of the old N.E.T fertiliser plant. The port cannot accommodate vessels larger than 82m and the entrance channel is relatively shallow and restrictive with depths of between 1.8 and 3.0 m at low water.

There are lift cranes available of 25-49t and 50-100t capacity. Mobile cranes can be provided if needed for lifting cargo, small craft or project equipment such as turbines / blades for wind farms. Local stevedoring, marine services, chandlers, shipping and forwarding agents are available. A pilot boat operated from the port which is also a major location for the RNLI lifeboat operations.

The Port of Arklow is the headquarters of "Arklow Shipping", on of the largest shipping companies in Ireland with a fleet of 37 cargo ships operating throughout the world.

Arklow Port and the Offshore Energy Sector

Arklow is the nearest port to Ireland's first offshore windfarm which is located on Arklow Bank approximately 10km from the coast. The site has a project capacity of 25MW and currently consists of a pilot development comprising of 7 GE wind energy machines which generate 3.6 MW of electricity. The project developers are Airtricity, a world leading fully integrated renewable energy company and GE Wind Energy who built and currently operate the 25MW Arklow project. GE Wind Energy is one of the world's leading wind power companies that design and manufacture wind turbines and offers support services from project development to operation and maintenance. It has a local office based in Arklow. Each turbine weighs up to 150t, has a height of about 125 m and are supported by steel monopole foundations driven into the seabed.

The Port of Arklow has experience in handling and berthing a variety of vessels that support the offshore renewable wind energy sector. Most of these vessels have been associated with the offshore wind farm on the Arklow Bank. These include the 78m long cable laying barge "Coastal Spider", anchor handling tugs, work barges, split barges and a jack-up rig for wind turbines. The port however, has limitations with regard to depth, ship size access and hinterland space for operations.

The local boat yard "Arklow Maritime Services Ltd" is currently building catamarans to service the offshore wind energy sector and has recently launched its first vessel in Arklow Port. Another is presently under construction for work on UK windfarms.

Outside of Arklow Port, a kilometre to the south of the town, is a large quarry owned by the Roadstone Wood Group (RWG). There is deep water (8.0m) adjacent to the site with a jetty which is used to offload stones, boulders and gravel into vessels for marine engineering operations. With adequate investment and development of quay infrastructure, this location has good potential for providing support facilities for offshore windfarms. It would be especially suited for manufacture of offshore windfarm foundations. It is understood that plans are already underway to seek potential partners to develop the site to support a manufacturing operation for these concrete foundations.

Future Strategy – Offshore Renewable Energy Sector

The Port has experience as a service base for the installation of the offshore windfarm on the Arklow Bank. However, there is presently no strategy in place to promote the port as an operational, maintenance and servicing centre for offshore renewable energy developments. Any future port developments in relation to the offshore renewable energy industry will depend on economic activities associated with increasing the capacity and expansion of offshore wind farms along the east coast and improving the port facilities, infrastructure and resources to cater for business developers and partners.

Information

Arklow Port Booklet – published by Arklow Harbour Commissioners (no date)

No website available for the Port of Arklow

Conclusions

The Port of Arklow is well positioned to service the Arklow Bank and Codling Bank offshore windfarm developments which are located between 10 and 30 km from the coast nearby. It has experience working with a number of vessels associated with the installation of turbines offshore. However, the port has limited quay space and facilities and would be unable to serve as a significant centre for the operations and maintenance of offshore windfarms. The Roadstone Wood Group (RWG) located outside the port with its own deep water jetty has the potential to provide facilities to support a manufacturing operation for offshore windfarm foundations but would require further investment and infrastructure to establish a viable business.

THE PORT OF ARKLOW HAS BEEN CLASSIFIED AS A **CATEGORY C** FOR THE PURPOSE OF THIS ASSESSMENT.

Rosslare Europort

VESSELS OVER 200m IN LENGTH

962m OF QUAY SPACE

WATER DEPTH 7.2–10m

Background

Rosslare Europort is located at Rosslare Harbour in Co. Wexford in the south east part of Ireland (Figure 5). It handles passenger and freight ferries which operate to and from Fishguard and Pembroke Docks in Wales (Stena Lines, Irish Ferries) as well as Cherbourg and Roscoff in France (Irish Ferries; Celtic Link Ferries). The port is owned and operated by Iarnród Éireann, which also provides direct passenger rail links to Dublin. Rosslare Europort is the fourth largest port in Ireland by tonnage handled. It is well positioned to service offshore windfarms and tidal resources off the south east coast of Ireland and as well as some UK sites such as development planned for the Bristol Channel.

Infrastructure and Facilities

Rosslare Europort has 962m of quay space comprising 4 berths which are used for ferry services and Ro-Ro container traffic. These berths can cater for vessels of between 148 and 221m long and have water depths of 7.2 to 10m alongside.

It also has a general cargo berth of 150m in length capable of handling vessels up to 140m long. The depth at this quay is 7.2 m CD with unrestricted access up to depths of 6.5m. There is land behind the general purpose quay which extends to about 10 hectares. About 5 hectares of this would be available for development. A loading restriction of 2 tonnes per m2 is in operation for about 7.5 m behind the quay which is otherwise unrestricted. Although services could be provided to offshore windfarm developers, limitations in term of the amount of hinterland available and water depth at the general cargo berth is likely to restrict any future major offshore development. This may change in the future as Rosslare Europort is planning to deepen the harbour.

Although primarily a ferry/passenger and container port, mobile cranes, stevedoring and various other marine services can be brought in for various projects when required. Pilotage is not compulsory to enter the port as there is adequate depth for most vessels.

FIGURE 5. AERIAL VIEW OF ROSSLARE-EUROPORT.

Rosslare Europort and the Offshore Energy Sector

Rosslare Europort is strategically located on the south-east corner of Ireland and is capable of servicing a wide range of windfarms in both the Irish and UK sectors of the Irish Sea. These include the Arklow Bank (25MW), Arklow Bank Phase 11 (495MW), Oriel (330MW), Codling (1000MW), Bray Offshore (201MW), Kish (225MW), the Bristol Channel (1,500MW) and Anglesey (4,000MW).

The port has already experience with the offshore wind energy sector and has had over 20 shipments of wind turbine blades and towers arrive at the port for assembly and subsequent deployment onto the Arklow Bank and other windfarms. Imports have also been made through the port for land-based wind generators in the region. Large floating barges and jack-up rigs have used the port for loading and unloading wind turbines and blades and assembly.

In addition, there are a number of service providers to the offshore wind energy industry in the Irish Sea based at the Whitemill Industrial Estate, Wexford and who work out of Rosslare Europort. These include Irish Sea Contractors, an international underwater engineering company with over 25 years of subsea engineering experience including cable installation and repair, diving, underwater welding, pile protection installation and debris clearance. Morrissey Engineering and Maintenance Ltd is another company which has experience in fabrication and precision engineering with installation, mechanical and electrical maintenance of wind turbines in both Ireland and the UK. They have worked with International wind energy companies such as Vestas, Gamsea and Nordex.

Training and building capacity for the offshore wind energy industry is also being facilitated in Wexford by Daralinn Training and Consultancy Company and Chevron Training. Part of Daralinn's programme includes a 26 week training module in a broad range of skills necessary to become expert in the maintenance of wind turbines and associated technologies.

There are also a number of crane hire companies who can deploy crane and related equipment at Rosslare Europort.

Tidal power has also some potential for development off Rosslare with two sites (positioned about 8 km east of the port) having been designated in a recent study as being suitable to generate energy from tidal flows.

Future Strategy – Offshore Renewable Energy Sector

Rosslare-Europort is interested in business and partnerships associated with wind farms in the Irish Sea and has prepared some strategies to promote the port and attract offshore renewable energy developers. It is also prepared to offer quay space and hinterland close-by for storage of turbines. However, existing plans are limited and mostly opportunistic in response to developer's requests. The primary focus and future strategy for Rosslare-Europort is to continue with its current core activities with the passenger ferries to the UK and France and Ro-Ro / containerised units which makes up the bulk of the business of the port. Iarnród Éireann is reviewing its medium and long-term plans for the development of Rosslare Europort including the expansion of its Ro-Ro business into LoLo and the possible development of a Rail Freight terminal. It also plans to reclaim up to 20 hectares of additional land and to deepen parts or all of the port from the present 7.2m to 9m and perhaps even 11m CD. At present, Rosslare-Europort management consider that there is a need at National level to develop and deliver confidence to the sector and that more needs to be done to make it attractive for multi-national renewable energy companies to locate in Ireland.

Information

Rosslare Europort : Wexford County Development Plan: Submission to Wexford County Council, 3rd June 2011: TEN-T Policy Review: Submission to DG MOVE by Rosslare Europort; 13th September 2010: Brochures : Rosslare – Europort marketing package with information sheets on Irish Sea Contractors, Morrissey Engineering and Daralinn Training Centre; Potential tidal sites (Wexford Country Council).

Website: http://www.iarnrodeireann.ie/rosslare/home/

Conclusions

Rosslare Europort is in a strategic position to provide operational and maintenance services to existing and future windfarms and tidal arrays along the east / south east coast and Irish Sea. It is between 50 and 120 km from a number of installations and has considerable potential to provide services to windfarms off the coast of Wales and England including the Bristol Channel. The Port has some restrictions in relation to space available and hinterland but views the offshore wind industry as a potential source of business and has commenced to market the port to developers. Plans are in place to reclaim additional land and further deepen parts of the port.

ROSSLARE EUROPORT HAS BEEN CLASSIFIED AS **CATEGORY B** PORT FOR THE PURPOSE OF THIS STUDY.

PORT OF WATERFORD CO. LTD.

Port of Waterford

VESSELS UP TO 40,000 (DWT)

850m OF QUAY SPACE

OFFSHORE SERVICES "FASTNET SHIPPING LTD"

Background

The Port of Waterford is located on the River Suir about 10 miles upstream from the open sea. It is close to the Cork / Dublin motorway and is connected by rail to the national transport system. Its main operations centre is in Belview, an uncongested and compact location about 4 miles downstream from Waterford City. At high tides, vessels with drafts of between 9.0 and 9.5m can pass through the Duncannon bar on the approaches to the port. The Port of Waterford activities comprise of container cargo, break bulk and bulk (Belview) with seasonal cruise ship calls at the City. There are also two private quays which handle bulk and liquid bulk, one at Belview and the other at Great Island.

In terms of offshore renewable energy developments, the Port of Waterford is well positioned to service tidal and wind resource developments along the south and east coasts of Ireland with potential to extend services to UK windfarm in the Bristol Channel.

Infrastructure and Facilities

The facilities at Belview comprise over 850m of Port Company quay and 120m of private quay with a water depth of 8.0 to 10.0m CD (Figure 6). There are two 50t gantry cranes which load and discharge containerised cargo and four mobile cranes that can handle up to 40t. The Port can accommodate vessels of up 190m long and 40,000t dwt. There is a rail connection directly to the quay.

There is a good level of support services offered by the port including stevedoring, tugboats and workboat provisions. Tugs are available from private operators and range from 5t – 40t bollard pull. Wind farm service vessels are also available.

The port has planning permission in place for an additional 800m of quay and up to 13 acres of reclaimed working area adjacent to the existing facilities at Belview. It has also access to a further land bank of about 250 hectares of zones port related property adjacent to the operational terminal which could be made available to developers. The IDA work closely with the Port of Waterford at Belview and have services sites available at the nearby business park.

FIGURE 6. AERIAL VIEW OF PORT OF WATERFORD – BELVIEW.

Port of Waterford and the Offshore Energy Sector

The Port of Waterford has experience in dealing with the offshore renewable energy sector. It has handled the unloading of wind turbines and other components of wind energy equipment through the port using its gantry and harbour cranes. Some exploratory contacts have already been made with the Port of Waterford by offshore renewable energy developers including a number of foreign companies.

Fastnet Shipping Ltd, a company based at the Port of Waterford has extensive experience in providing services to offshore windfarms in the Irish Sea including the Tees Offshore, the Robin Riggs and the Kish, Bray and Codling Bank windfarms. It operates a number of specialised CAT vessels which services turbines as well as tugs and jack-up barges. Work to date involved site surveys, pipeline and drilling coordination, crew transfer and provision of supplies.

Future Strategy – Offshore Renewable Energy Sector

The Port of Waterford has identified the offshore wind energy industry as an additional and potential source of business but so far has not developed a defined strategy to promote and attract developers. Some opportunistic contacts have been made with a number of developers to date but these have not yet yielded results. It is expected that the core business activities of the port will continue as they are at present. Future opportunities in relation to the offshore renewable energy sector are likely to be in relation to servicing and maintenance operations for windfarms and tidal arrays located in the Irish Sea. Planning permission is in place for an additional quay and for further land to be reclaimed adjacent to existing facilities which could support the sector. There is also extensive land for business sites located close-by which could also make the areas attractive for developers at a future date.

Information

Full details of the Port of Waterford are given on their website: www.portofwaterford.com . This includes details of operations, containerised cargo, break bulk and liquid bulk, storage facilities and stevedoring services. Information is also given on port governance and financial matters including port accounts.

Conclusions

The Port of Waterford is in close proximity (between 50-120km) to a number of offshore wind farm sites along the east coast of Ireland and south west England and has good infrastructure and facilities to operate as a servicing / maintenance centre for offshore wind farms located in the south Irish Sea. There is also land available and planning permission for a quay extension. The port has some limitations in terms of distance from the open sea, access to the port at some stages of the tide and a railway line positioned along the quayside. Although, an active strategy to market the port to offshore renewable energy developers is not yet in place, some initial contacts have been made with major Asian companies to examine potential opportunities for the port to facilitate and meet the requirements of the industry.

THE PORT OF WATERFORD CAN BE CLASSIFIED AS A **CATEGORY B** FACILITY IN TERMS OF MEETING THE REQUIREMENTS OF THE OFFSHORE RENEWABLE ENERGY SECTOR.

Port of Cork

MARITIME TRADITION AND SKILLED LABOUR

15,000m² OF COVERED STORAGE

UP TO 13.0m WATER DEPTH

Background

The Port of Cork is located in the south of Ireland and is accessed via a deepwater natural harbour. The company services the requirements of all six shipping modes i.e. lift-on lift-off, roll on-roll off, liquid bulk, dry bulk, break bulk and cruise liners. The Port has a number of different strategic terminals located at four locations from the centre of the City and down river, to Tivoli, Cobh and Ringaskiddy. The Port of Cork facilities at the City quays continue to account for significant amounts of total cargo as well as a small number of cruise ships, naval and research vessels.

The Port of Cork has extensive experience in handling large project cargo and holds a good track record of importing wind turbines and other special project cargoes. It has unrestricted 24 hr berthing for vessels at Cork Dockyard and Ringaskiddy deepwater quays. Cork Dockyard provides a complete service in both marine and general engineering. Services include ship repair, port repair, industrial engineering, marine workshops and conversions. There is a strong maritime tradition in Cork Dockyard with facilities accommodating many different types of vessels including general cargo vessels, coastal vessels, tug and fishing vessels, passenger ferries, naval vessels and dredging / survey vessels.

The Cork Dockyard is also a significant industrial area in the Port. It was established in 1853 and came to prominence in 1959 when it became known as the Verolme Shipyard. It was purchased by the Doyle Shipping Group in 1995 and became a member of the Burke Shipping Group in 2010. The Dockyard is strategically located in Cobh, Co. Cork and offers deepwater facilities close to continental Europe's main shipping lanes. It is a fully serviced 44 acre coastal site with on-site engineering facilities and provides an attractive location for a logistics base or prototype building and testing for the renewable energy sector

The Port of Cork at Ringaskiddy also contains the International Maritime and Energy Research Campus and Cluster (IMERC) which is a valuable centre of expertise in Cork Harbour to support the maritime and energy sector through producing innovative technical solutions and services. The National Maritime College of Ireland is also located close by and represents a key critical infrastructure to provide technical support including ship simulator suites, technical workshops and sea survival training pool.

Infrastructure and Facilities

There are six main quays located in the city. The quays have a total length of 952m with water depths between 5.6 and 8.8m CD. There is available space of about 15,000m2 along the quaysides.

At Ringaskiddy, there is a deep-water quay with a length of 485m and with a water depth of 13.5 m CD (Figure 7). Hinterland space is also available near the quay which covers an area of about 16,000m2. At the Cork Dockyard site, there is an 800m length of quay space with a water depth of 7m CD. Future development plans for the Port of Cork could make up to 80 acres of space available at Ringaskiddy.

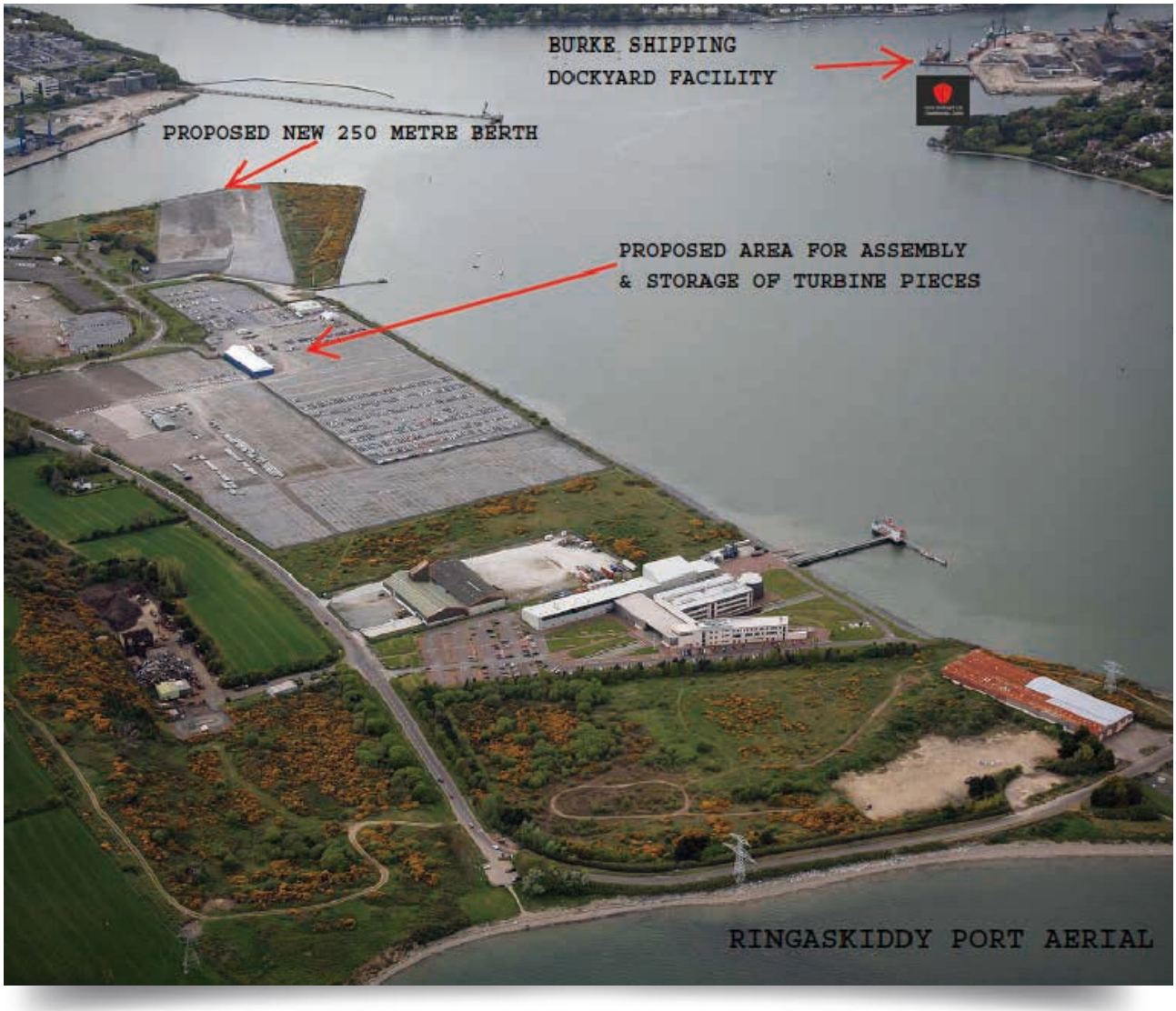


FIGURE 7. AERIAL VIEW OF RINGASKIDDY SHOWING QUAYSIDE BERTHS AND HINTERLAND.

The Port of Cork has extensive infrastructure and stevedoring support service with tugs available both by the port and privately owned. The present tugs being used have bollard pull of 32t, 46t and 50t respectively. There are two mobile cranes at the deepwater port at Ringaskiddy (65t and 100t) and heavy lift cranes can also be accommodated. Cork Dockyard has the capacity to erect a 1000t crane. Full engineering services are available and there is a dry dock which can accommodate up to 150m LOA and 26m beam.

The Cork Dockyard facility (Figure 8) has 800m of quay wall with relatively deep water (7.66m CD) and reinforced quay capable of facilitating heavy lifts with a 1000t crane. It has dry dock facilities, 40t lifting cranes along fitted out jetties and berthing for up to nine vessels. Cork Dockyard has 15,000 m2 of covered storage which contain internal gantry cranes with 40t lift capacities. There is also about 180,000 m2 of open space for storage and lay-down.

The Port is well connected to the national road network although there are some limitations with regard to road access to Cork Dockyard.

Port of Cork and the Renewable Energy Sector

The Port of Cork has significant experience with the offshore energy sector. The Port has been used as the main servicing base for the offshore oil and gas exploration off the south coast for decades. It has been closely involved with the development of Marathon and Kinsale gas and has constructed and floated out structures in the 1970's. Accommodation platforms have been built in the Cork Dockyard for offshore oil rigs operating in the North Sea. Seismic survey vessels, research and supply ships, cable and pipe laying vessels and other platforms for oil and gas exploration frequently use the Port of Cork for services. Jumbo heavy lifts have been made in the port for many local industries including a 240t single point mooring buoy for tankers.

Ringaskiddy terminal has handled the importation of wind turbines for farms in southern Ireland and the lifting and storage of other ocean energy equipment. The quarter scale wave energy converter (Ocean Energy Ltd) was manufactured and fitted out in Cork Dockyard before deployment at a test site off Spiddal, Co. Galway.

The Port has considerable potential to be a hub for the marine renewable energy industry and offshore servicing of the energy sector in general. A combination of the Port of Cork and Cork Dockyard together with available land at Ringaskiddy would make the region attractive to developers (see section below on Burke Shipping Group). The city section of the Port of Cork is unsuitable because of space limitations. Despite the distance from the Irish Sea windfarm sites, the Port of Cork has the necessary infrastructure, quay length, water depth and hinterland space as well as experience in the ship handling, construction and fabrication of steel equipment and engineering experience to make it a favourable location as a centre for marine renewable energy sector in Ireland.

FIGURE 8. AERIAL VIEW OF CORK DOCKYARD.

Future Strategy – Offshore Renewable Energy Sector

The Port of Cork has developed a focused strategy for the offshore renewable energy sector and is actively pursuing opportunities in the offshore wind sector. It is currently undertaking a review of its strategic plan, infrastructure and development and has identified Ringaskiddy as a prime location for wind turbine assembly although a new quay may be required to adequately service the requirements of this sector.

Cork Dockyard are also presently pursuing an active marketing strategy to attract offshore wind energy developers to use its facility and have been in talks with one of the major turbine manufacturers with regard to leasing the site as an assembly, operation, maintenance and servicing hub for offshore windfarms. It is expected that if a successful agreement is reached, the site becomes operational in early 2015 and that between 100 and 200 jobs could be generated in the short to medium term.

When packaged together, the Port of Cork (including Ringaskiddy and Cork Dockyard) have much to offer developers and meet many of the requirements needed as a major service base and hub for the sector. The various sites have already attracted interest from European, Japanese and Chinese investors involved in the manufacturing of wind turbines and generators.

Information

The full review of the Port of Cork is contained in it's recent Strategic Development Plan (2010): Further information on the port is contained in the following brochures:

- Port of Cork – International Energy Hub
  "A Sheltered Deep-Water Harbour"
- Port Of Cork – Newsletters "In Depth"
- Port of Cork – Official Port May
- Cork Dockyard – Renewable Energy Hub
- Burke Shipping Group: Foynes Offshore Oil Support Services

Full details on the infrastructure, facilities, operations and services offered by the Port of Cork and Cork Dockyard are available on their website:

www.corkdockyard.ie
www.burkeshipping.com
www.portofcork.ie

Conclusions

The Cork area through the Port of Cork (Ringaskiddy and Cork Dockyard sites) has strong potential to become a hub for the offshore marine renewable energy sector covering the south-east, south and south-west coast of Ireland and the south-west coast of the UK. Although it is located some 150 – 200km from the present markets i.e. current and planned offshore windfarms in the Irish Sea, the Port offers a lot of advantages including deep water, extensive quay space, land banks and hinterland, dockyard and dry-dock facilities with heavy lift capacity, marine engineering and steel fabrication / construction skills. It has considerable experience with servicing the offshore energy sector (oil and gas) and has been closely involved in the development of ¼ scale wave energy converters.

The Cork Dockyard would not require planning permission for a pre-assembly project and therefore would be up and ready to go should a developer be interested in the site. It could also serve as a hub for wave and tidal energy once this industry begins to develop over the next decade following testing and commercialisation of wave energy converters and tidal turbines.

Cork Dockyard has been identified by a number of foreign groups as a potential hub for the offshore wind energy sector with the necessary infrastructure and facilities including quayside lengths, water depth, hinterland and dry dock to support operational, maintenance and servicing of offshore windfarm installations (Category A). Danish consultants Ramboll have recently concluded a study which estimated that the cost of bringing Cork Dockyard up to the same level as that of Belfast Harbour D1 site would be considerably less that what is currently being spent on their site. The area given its connection with the shipbuilding and ship repair facility would also likely have an abundant skilled labour force with particular skills in fabrication, metalwork, engineering and construction, all of which are important skill sets for the offshore windfarms construction.

The Port of Cork is also regarded as an emerging centre of excellence for marine technology, maritime training, sustainable marine renewable energy research and development and naval architecture through its associated links with University College Cork, National Maritime College and IMERC.

FOR THE PURPOSES OF MEETING THE REQUIREMENTS OF THE OFFSHORE RENEWABLE ENERGY SECTOR INCLUDING WAVES AND TIDAL, THE PORT OF CORK HAS BEEN CLASSIFIED AS A **CATEGORY A** FACILITY.

Shannon Foynes
PORT COMPANY

Shannon Foynes Port Company

GATEWAY TO ATLANTIC CORRIDOR

VESSELS UP TO 200m IN LENGTH

15,000m² OF HINTERLAND

Background

The Shannon Foynes Port Company (SFPC) is responsible for management of all marine navigation and shipping on the Shannon Estuary, covering the area from Kerry Head and Loop Head and inland to Limerick City. In addition to controlling shipping in relation to several facilities (Foynes, Limerick, Moneypoint, Shannon, Tarbert, Aughinish and Kerry Deepwater Zone) currently in the Estuary, the company provides a range of shore-side services including cargo handling, logistics and distribution (Figure 9).

FIGURE 9. MAP SHOWING THE POSITION OF THE PORT OF FOYNES AND OTHER JETTIES AND HARBOUR FACILITIES IN THE SHANNON ESTUARY.

The Shannon Estuary's location on the south west coast provides an ideal gateway to Ireland's "Atlantic Corridor" and is also attractive as a possible European hub for future marine renewable energy activities off the west and south west coasts particularly in relation to wave energy converters and for future offshore floating wind farms. Possibilities also exist for tidal turbines at specific location in the Shannon estuary.

SFPC has a detailed roadmap for the development of its facilities to cater for anticipated growth in the coming decades (see MasterPlan).

FIGURE 10. AERIAL VIEW OF FOYNES PORT WITH FOYNES ISLAND IN THE BACKGROUND.

Infrastructure and Facilities

Foynes is the principal general purpose deep water facility in the Shannon Estuary and caters for vessels up to 200m in length with a draft of 10.5 m. There are two jetties located at the harbour, the west jetty which is 265m long and the east jetty which is 295 m long. The hinterland associated with these two jetties is approximately 15,000 m2 with about 30,000 m2 of covered warehouse space available along with serviced sites for future port development (Figure 10).

Shore-side operations are serviced by modern cranage and handling systems which includes five mobile cranes (63t). Port facilities are backed up by three state-of-the art tugs (45-50t bollard pull) and ancillary services. The terminal specialises in dry, liquid and break bulk cargoes as well as special projects and heavy lifts. Other activities include Ro-Ro, Lo-Lo and container handling as well as passengers associated with occasional visits of up to 5 cruise liners per year.

The Shannon Foynes Port and the Ocean Energy Sector

The west coast of Ireland is Europe's closest point to some of the world's best wind, wave and tidal resources and having a base to access and service the offshore renewable energy platforms is a key consideration for the industry. The SFPC is actively promoting the Shannon Estuary as an attractive location for this new and vibrant renewable energy sector. Shannon-Foynes has the experience and understands the needs of the industry and is determined to support and encourage the development of the sector thorough its own resources and in partnership with other agencies and stakeholders. The Port has the potential to host a significant cluster of activity centred on the development and maintenance of ocean energy devices. The attraction that the Shannon Estuary region and Foynes in particular have to offer include:

- Geographic location adjacent to principal sites on the west coast of Ireland
- Proximity, in shipping terms to other potential regions in NW Europe
- Deep water berths and relatively uncongested shipping lanes
- Connectivity through Shannon International Airport

- Core skills including a tradition of manufacturing and maritime industries together with third-level educational institutions
- Favourable investment and cost environment
- Proximity to existing 400 Kv transmission lines

Foynes has historical links to the ocean energy sector. It was a key port for servicing the offshore oil and gas exploration activities that took place off the west coast in the 1980's. At present up to 50% of all land-based wind turbines imported into Ireland come through the port. Although Foynes can supply some support services to marine renewable energy development activities, it is somewhat constrained at present to cater for large scale development operations. However, the future upgrading of facilities along with harbour expansion plans, the availability of additional quay space and adjacent hinterland could position Foynes as an ideal location for manufacturing, assembly and servicing of ocean energy generators including waves, offshore wind and tidal developments taking place off the south west and west of Ireland.

The Shannon Foynes Port Company was of the opinion that if a viable national marine renewable energy sector is to be developed that more co-ordination was required by the various State Agencies and Government Departments. SFPC calls for a defined roadmap for commercial operators and a dedicated team with focused leadership functions from amongst the various state agency stakeholders to take the industry forward. A website that would promote Irish ports in relation to meeting the immediate and longer-term requirements of the marine renewable energy industry would be useful in highlighting the facilities, infrastructure and facilities that are available and in outlining those planned for the future needs of the offshore energy industries.

Future Strategy – Offshore Renewable Energy Sector

The Shannon Foynes Port Company is actively engaged in promoting the Shannon Estuary as a European Ocean Energy Hub and is developing a strategy to market Shannon Foynes as an ideal location for the manufacturing, assembly and servicing of ocean energy generators. It has produced attractive brochures highlighting the technical knowledge, experience, facilities and infrastructure of the port as well as the advantages in terms of location, water depth, supporting industries, research and development and incentives. Shannon Foynes is moving ahead with plans to develop an additional port working area behind the existing east jetty. It has also prepared a comprehensive masterplan in which further quay and hinterland space would be provided that would enhance the attractiveness of the port for marine renewable energy developers. A further site on Foynes Island has been identified which offers a very good long-term development potential as a dedicated deep-water hub for the offshore renewable wind and wave energy sector.

Information

Full details of ports infrastructure, facilities and operations of Shannon Foynes are given on the website www.sfpc.ie with additional information on Limerick Port Terminal, Moneypoint, Shannon, Tarbert, Aughinish and the Kerry Deepwater Zone given in www.shannonestuary.ie. Specific brochures: are also available i.e. Shannon Foynes Port Company – Ireland's premier Deepwater Facilities; Europe's Ocean Energy Hub – Shannon Foynes Port Company. A Master Plan for Shannon Foynes Port has also been developed and is available on the website.

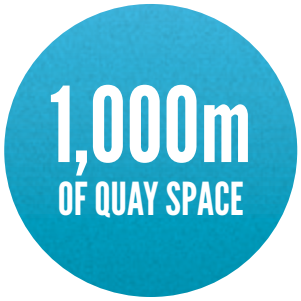
Conclusions

The Port of Shannon Foynes offers an attractive location as hub for future marine renewable activities off the west and south west coasts of Ireland particularly in relation to future offshore floating wind farms and wave energy converters. It has deep sheltered facilities, large potential land banks, good infrastructure and skills in various manufacturing and maritime industries. It has also one of the best wind and wave energy resources in the world on its doorstep. At present, Shannon Foynes is located a considerable distance (300-400km) from existing renewable energy markets which are centred on windfarm developments in the Irish Sea. Commercially available offshore floating windfarms and wave energy converter arrays are not expected to be commercially available for another 10 years. Although currently constrained in terms of meeting the needs for large scale renewable energy developments, Shannon Foynes has plans to upgrade facilities and expand quay space to cater for future opportunities in the offshore renewable energy sector. It is actively marketing the port to potential developers and looking at possibility of constructing a new "state of the art" facility on Foynes Island to meet the future needs of the industry. With the advance of new technologies and the opening up of the south and west coast to offshore floating wind and wave farms, the opportunities for job creation in the region are very good in the medium to long term.

FOR THE PURPOSE OF THIS STUDY, THE PORT OF SHANNON FOYNES CAN BE CLASSIFIED AS A **CATEGORY A** PORT

Galway Harbour Company
Comhlacht Cuain na Gaillimhe

Galway Harbour



Background

Galway Harbour is located in the heart of the city and occupies a strategic location on the west coast that could service the developing offshore marine renewable energy and oil and gas sector. It has a strong maritime tradition over the centuries and in the past had active trading links with Spain and France.

Infrastructure and Facilities

There are six quays available with a total length of over 1 km. These comprise of Mulvoy Quay (209m), Breatnach Quay (315m), Dun Aengus North (165m) and South quays (192m), Folan Quay (89m) and Quirke Quay (80m). Water depth at Dun Aengus Quays at low tide is 3.6m CD while the rest of the harbour is 2.9m CD. The approach channel to the harbour has been maintained by periodic dredging at 3.5 CD. The gated docks provides berths for commercial vessels (up to 6000 tonnes) and yachts and retains high tide water levels has a depth of over 8m. It is the home port for the national research vessels Celtic Explorer and Celtic Voyager, operated by the Marine Institute.

The main commercial activities of the port focus on bulk liquids, dry bulk and break bulk. A rapid catamaran ferry service transferring passengers to the Aran Islands will commence shortly and up to eleven cruise ships called and transferred passengers to Galway Harbour for local tours during 2012. The Volvo Ocean race finished at Galway in 2012 with much of the celebrations and commercial activities associated with the race finish taking place around the harbour waterfront. It was a resounding success for Galway and Ireland Inc.

The port infrastructure and level of support services are good with stevedoring, pilotage and other vessels readily available. A number of mobile cranes operate within the harbour with lifts of up to 300 t capacity being available. Storage space alongside the quays is limited but several acres of lay-down space are available at the nearby Galway Harbour Enterprise Park which comprises a 45 acre industrial and business park.

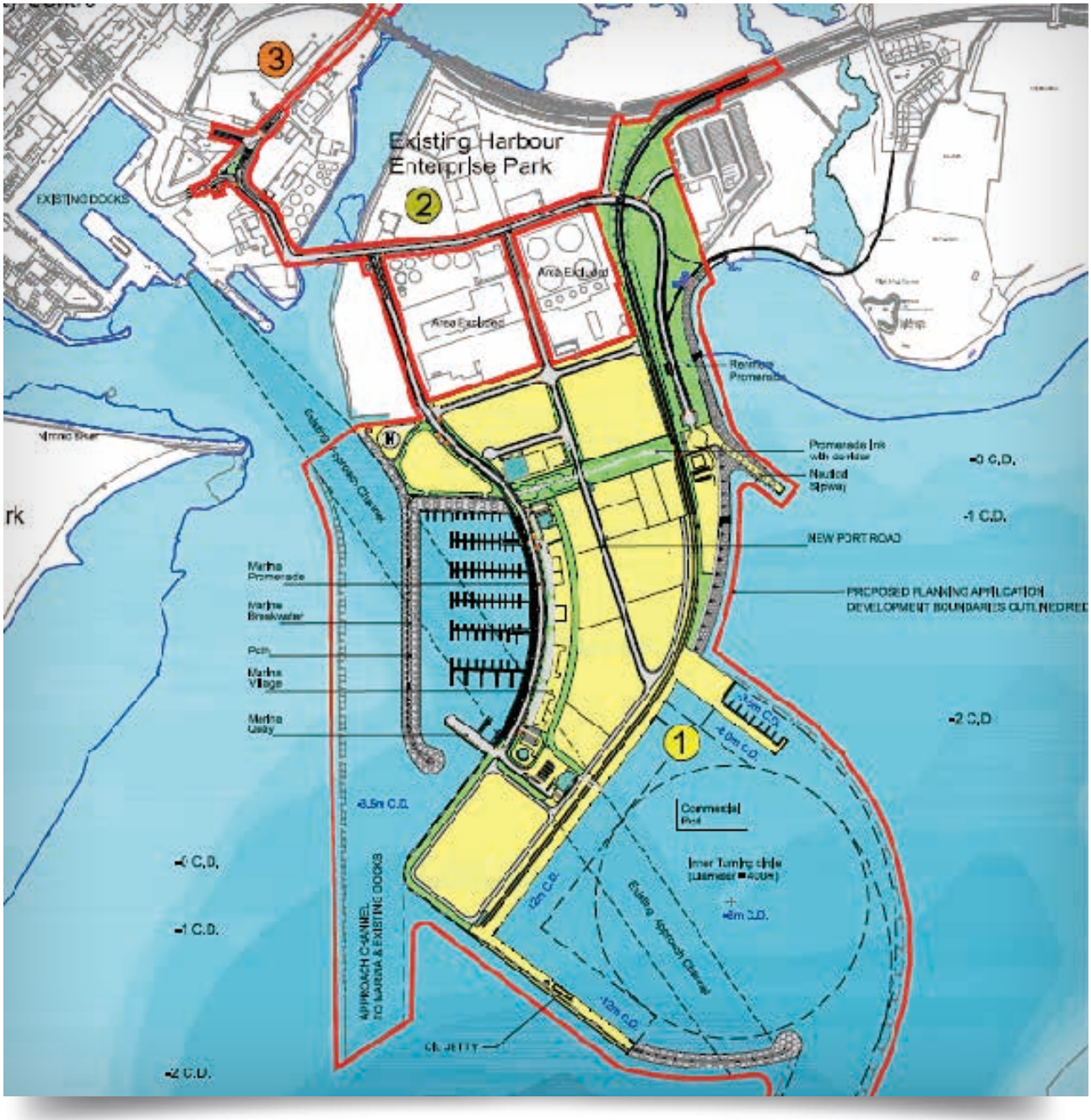


FIGURE 11. SCHEMATIC DIAGRAM OF STAGES OF CONSTRUCTION OF THE NEW PORT OF GALWAY.

Galway Harbour and the Offshore Energy Sector

The Galway Harbour Company views business opportunities arising out of future developments and services to the marine renewable energy and offshore oil and gas sectors as very important and is prepared to invest in improving existing facilities to attract developers and ocean energy technology companies. Furthermore, it has developed a strategy with Galway Chamber of Commerce under "A Vision for Galway 2040" where Galway Harbour Enterprise Park would become a hub for ocean energy technology companies. Dry-dock facilities and test tank infrastructure located at the port would allow marine data systems and sensors to be tested and calibrated as part of the national SmartBay testbed initiative. A long-term lease has been signed with the Marine Institute to locate SmartBay at Galway Harbour Enterprise Park.

Future Strategy – Offshore Renewable Energy Sector

In the existing harbour, the Galway Harbour Company has limited facilities to offer the offshore renewable energy sector. Although it has been in contact with offshore windfarm developers, there is no specific strategy in place to market the port as a centre for offshore wind and wave energy development. The company has recently produced a comprehensive development plan which allows for both the maintenance of current core port activities and enhanced growth and expansion of the business (Figure 11). A key part of the strategy for the future development of Galway Port is having an integrated multi-purpose facility that will cater for existing core activities as well as marine tourism and leisure, the marine renewable energy sector and maritime business activities. In the case of the marine renewable energy sector, it is envisaged that an expanded Galway Harbour Business Park will host some SME's specialising in ocean energy technologies, data management, marine communications, informatics, smart environmental sensors and ocean data buoys. Port facilities will also be made available for R&D and to test smart buoys and ¼ scale wave energy converters before deployment at sea. Further details are given in the Galway Vision 2040 discussion document (2011) – Marine and Energy Sub-Group – Galway Chamber of Commerce.

Information

Galway Harbour Company has prepared a detailed brochure on future development plans for the port "Galway Port Development Plan – it's your harbour".

A discussion document has also been produced "A vision for Galway 2040 – Marine and Energy Sub-Group" by the Galway Chambers of Commerce; see Galway 2040 Report: http:/galway2040.ie/marine

Details of Galway Harbour, its infrastructure and facilities including future plans can be found on the website: www.galwayharbour.com

Conclusions

Galway Harbour is strategically located to take advantages of opportunities in marine renewable energy developments especially from offshore wind and wave resources off the west coast. Potential for using the harbour by the sector is limited at present due to constraints with regard to depth, quay space and available hinterland for assembly and storage of towers and turbines. The distance to current markets i.e. windfarm developments in the Irish Sea is between 350 and 400km which make using Galway Harbour as a service base for Irish Sea operations impractical.

Ambitious plans are in place to construct a new harbour which would significantly increase the commercial potential in all areas of maritime activities including marine tourism, marine renewable energy and an associated marine technology business park. Technology that would allow for commercial development and operation of floating offshore wind turbines and wave energy converters are not expected to be available for another 5 to 10 years by which time Galway Harbour may have its new facilities.

Galway Harbour Company has engaged with NUIG/GMIT/MI/IDA and is promoting Galway Harbour as a centre of excellence for marine related SME's and the IT sector. The 'Harbour Campus' sets out an overarching plan to provide business and academic bases in the heart of the harbour and city centre. The signing of the long-term lease with the Marine Institute for locating SmartBay at Galway Harbour is a step towards establishing the Harbour Campus as the west of Ireland's foothold in ocean and wave energy businesses.

The Galway Harbour Company views offshore marine renewable energy and related smart ocean technologies as an important area for future business. Significant job creation potential exists in marine tourism, wave energy and marine "smart" technologies should the next harbour plans go ahead. Once the technology is available, future licensing and commercial operation of offshore floating wind and wave energy generation off the west coast of Ireland would offer enormous opportunities associated with management of operations, maintenance and servicing these installations.

GALWAY HARBOUR HAS BEEN GIVEN A **CATEGORY B** RATING IN TERMS OF THIS ASSESSMENT.

Killybegs Harbour Centre

Background

Killybegs, located in the north-west fringe of Ireland is recognised as Ireland's premier fishing port. Killybegs is the largest of six Irish fishery harbours and is the port with the highest share of national fish landings. It is home to the modern pelagic vessels which supply local caught pelagic fish (mackerel, horse mackerel, herring and blue whiting) to processing plants in the town. The Harbour has a wide variety of support services to the fishing industry including net making, electronics, electrical and refrigeration and engineering companies. In 2010, the fishing and seafood processing industries in Killybegs has a turnover of €250 million and employed over 500 people in the sector.

Infrastructure and Facilities

Killybegs Harbour Centre is designed to cater for vessels of up to 300m in length, 40,000 dwt and with a maximum draft of 12 m at low water. The new quay is 300m in length with 12m depth at CD and the smooth quay 150m long with 9m depth CD respectively. In addition to these new facilities, the original harbour comprises the Landing Pier, the Town Wharf, the Blackrock Pier and Blackrock Wharf. The total berthage in the old harbour is 807m with water depths varying from 3.6 to 7.5m. The original harbour area continues to be used mainly by the demersal fleet, smaller boats, pleasure craft and sea angling boats.

The level of support is good with three tugs (10t, 25t and 32t), a number of workboats and a skilled stevedoring service available. There are ship-repair facilities at the harbour with a synchro-lift capable of lifting vessels of up to 37m long and 580 t weight. Craneage is available locally and heavy lifts can be accommodated particularly at the new pier. There are excellent marine engineering and electronic services locally and road access to the port is good. Significant hinterland is available for development and expansion of facilities and there are hard stand areas of approximately 70,000 m2 adjacent to the quayside which can be used for temporary storage of cargo. Additional space is available in the Harbour's two storage sheds, a short distance from the port.

Besides the handling of large quantities of fresh and frozen fish, Killybegs Harbour Centre also caters for dry and break bulk, manufactured goods and heavy lifts, oil and gas exploration modules and supplies, containers, fuels and other general cargoes.

FIGURE 12. UNLOADING WIND TURBINES AT THE NEW QUAY IN KILLYBEGS HARBOUR.

Killybegs Harbour and the Offshore Energy Sector

In recent years, a new "state of the art "deep water port has been built to service the large pelagic vessels and to provide facilities and expand business with the developing offshore energy sector including marine renewables. Over the last decade, Killybegs has been used as the preferred port to provide offshore services to the Corrib Gas field and has developed business relations with key multi-national companies such as Shell, Statoil, Lundin and Eni.

In addition, Killybegs Harbour Centre is well placed to become a service centre and strategic base for, deployment, operations and maintenance of renewable energy technologies including wave energy converters and offshore floating wind turbines. We were informed that a number of offshore renewable energy developers are looking favourably on Killybegs as a port with potential to take advantage of the abundant resources of offshore wind and wave energy potential that lies off the North West coast. These companies include Enercon, Vesta, WaveBob and GE Wind Energy.

In the last few years there has been a large amount of wind turbines imported through Killybegs Harbour Centre to support the developing wind powered electricity generation projects throughout the North West (Figure 12). With the harbour becoming a supply base to service the offshore energy sector, there are an increasing number and cluster of companies with offshore supply capabilities operating out of Killybegs targeting the sector.

Training and capacity building in offshore wind power generation is also being addressed through a combined effort of the Letterkenny Institute of Technology and Killybegs Harbour Centre. This includes the construction and development of a 27 m high offshore wind training tower close to the new port perimeter.

In a recent report of a high level working group on the job initiative for the Killybegs region published in October 2011 (for Minister Simon Coveney), developing offshore support and promoting green and renewable energy were identified as two of the five key areas for job creation. It supports the idea of creating an ocean energy centre of excellence and highlighted the need for Killybegs to continue to build on existing resources in terms of infrastructure and skills with particular emphasis on offshore energy developments and on training for the sector as a whole. It called for an integrated approach to developing and managing the renewable energy sector including the need to provide a full range of services including the manufacturing of products relating to this new industry.

Future Strategy – Offshore Renewable Energy Sector

Killybegs Harbour Centre is developing a marketing strategy to show-case its facilities as a major deep water cargo and offshore port servicing the North West and west of Ireland. Although, it is regarded as Ireland's Premier fishing harbour, it also serves as an important based for offshore oil and gas exploration and service vessels. The Harbour Centre is interested in future business activities and partnerships with offshore renewable energy developments and is currently developing plans to market the port as a hub for assembly and installation of wind turbines and testing of wave energy converters off the North West coast of Ireland. Killybegs Harbour Centre is currently actively promoting its deep water harbour infrastructure and facilities to offshore renewable energy developers and has been in contact with key multi-national companies with regard to meeting their requirements for developing and servicing offshore wind farms.

Information

Detailed information on Killybegs Harbour Centre is provided on the website www.killybegsharbour.ie; Other information documents include a report of the High Level Group on the jobs initiative for the Killybegs Region – To Minister Coveney (October 2011) and a report on "The Development of Business Plans for the Fishery Harbour Centres by Raymond Burke Consulting and McIver Consulting: Department of Agriculture, Fisheries and Food (February 2009)

Conclusions

Killybegs Harbour Centre is well situated in relation to harvesting the rich renewable energy resources off the north west of Ireland. Good future opportunities could result from operational, maintenance and servicing activities associated with offshore floating windfarms and wave energy converters once this technology is fully commercially available and sites are designated for licensing off the west and North West coasts. Facilities at Killybegs Harbour Centre are generally very good and infrastructure can be expanded to create further deep water quay space and hinterland if required. The distance to existing markets i.e. windfarms in the Irish Sea and wave, tidal and wind resource sites off coast of Northern Ireland is between 120 and 150 km. The Harbour Centre is about 100 km from the national wave energy test site off Belmullet and is the port of choice as an operational and maintenance base for the Corrib Gas Field off the Mayo coast. There is good potential for job creation from offshore renewable energy in the medium to long term.

KILLYBEGS HARBOUR CENTRE CAN BE CLASSIFIED AS A **CATEGORY B** FACILITY FOR THE PURPOSE OF THIS ASSESSMENT.

TABLE 2. SUMMARY OF IRISH PORT'S FACILITIES AND INFRASTRUCTURE AND SUITABILITY FOR MEETING REQUIREMENTS OF THE OFFSHORE RENEWABLE ENERGY SECTOR

Port	Facilities and Infrastructure	Suitability – Offshore Renewable Energy Development
Port of Cork / Cork Dockyard / Ringaskiddy **CATEGORY A**	City :Six quays with total length of 952m and water depths between 5.6 and 8.8m; 15,000m2 quayside space; Cork Dockyard deep water quay 800m in length with water depth 7.0m; 15,000m2 covered storage areas and 180,000m2 lay-down space; Ringaskiddy, deep water quay 485m with depth 13.5m; up to 80 acres of space available: Extensive support services and infrastructure, stevedoring, tugs and mobile cranes (65-100t); Heavy lifts up to 1000t can be accommodated; Strong tradition in maritime sector, cruise industry and servicing offshore oil and gas exploration and production; engineering, shipbuilding, vessel design, steel construction and fabrication, dry dock facilities.	Considerable potential to be hub for marine renewable energy industry servicing farms in Irish and Celtic Sea Combined facilities of Cork Dockyard and Ringaskiddy offer very good opportunities for development of a pre-assembly centre for offshore turbines and manufacturing plant for foundations and towers. Ringaskiddy experienced in importation of wind turbines; Wave energy converter (Ocean Energy Ltd) manufacture and fitted in Cork Dockyard; R&D and training facilities UCC, HMRC and IMERC all close-by. Port Authorities actively pursuing opportunities in offshore wind sector and a number of investors and developers from China, Japan and Germany have been approached.
Shannon Foynes Port **CATEGORY A**	General purpose deep water facility: Two quays, 265m and 295m long with 10.7m water depth; Hinterland 15,000m2 and 30,000m2 warehouse space available; mainly dry, liquid and break bulk cargoes and special projects; good support service including tugs, 5 mobile cranes (63t), stevedoring and ancillary services; Experience with offshore oil and gas sector and marine renewables; handles 50% importation of wind turbines into Ireland; Port services important gateway to Ireland's "Atlantic Corridor" and coordination for other areas i.e. Foynes, Limerick, Moneypoint, Shannon, Tarbert and Aughinish.	Good potential as a centre for offshore renewable energy cluster on the south and west coast with attractive features including deep water, sheltered facilities, large potential land banks, skills in manufacturing and maritime industries, and close to excellent offshore renewable wave and wind energy resources; local potential for tide energy in Shannon estuary; Presently constrained in terms of large scale renewable energy developments; Development plans to upgrade facilities, expand harbour and make additional quay space and hinterland available for port activities; New "state of the art facility" to service the offshore energy sector could be established on Foynes Island; considerable development capital required.

Port	Facilities and Infrastructure	Suitability – Offshore Renewable Energy Development
Dublin Port **CATEGORY A**	Extensive quayside and storage with jetties at Alexandra Basin, Ocean Pier and South Deepwater Quay used for project cargoes. Quays between 224 and 410m long with water depths 9.6 -10.2m; South Quay 375m and water depth of 11m; Open quay space of 42,500m2; Good support services for commercial activities including unitised cargo, liquid bulk, dry bulk, Ro-Ro passenger ferries and cruise liners; Tugs and several cranes (10 – 84t); heavy lifts up to 200t.	Adjacent to wind farm sites in Irish Sea: Some experience with importing wind turbines; Port views offshore wind energy industry as a potential source of future business; Land identified and plans to re-organise existing operations to make area more suitable for storage, marshalling and assembly of wind turbines. Masterplan for new development at port identifies specific areas that could be made available for the offshore wind energy business; Investments could be made available for developments provided planning consents were obtained.
Killybegs Harbour Centre **CATEGORY B**	Deep water port development catering for large vessels; Quays 300m in length with 12m depth; 150m long with 9m depth; Good support service companies i.e.; Tugs, locally available mobile cranes, synchro-lift, marine engineering, electronics and ship repairs; Large area of hinterland 70,000 m2 at quays for hard stand/storage; Experienced providing services to offshore oil and gas sector and Corrib Gas field; Harbour handles and stores wind turbines;	Ireland's main pelagic fishing port also providing services for oil and gas sector and offshore marine renewable industry. Good supply base for operations off the north west coast. Suitable as location for operations, maintenance and servicing centre for wave energy converters; future possibilities exist for offshore floating windfarms. Present facilities can be expanded to create further deep water quay space and hinterland if developers wish to establish dedicated operational base. Support provided by LYIT in establishing wind turbine training centre;
Rosslare – Europort **CATEGORY B**	Primarily a Ro-Ro port with 4 berths used for ferry services and Ro-Ro container traffic. Can accommodate vessels between 148 and 221m long and quays have water depths of 7.2 to 10.0m; General purpose quay 150m with depth of 7.2m with about 5 hectares of land close-by available for development; Stevedoring, mobile cranes and other marine service can be brought in to handle specific project cargoes; Port expansion plans include reclaiming up to 20 hectares of additional land and deepening to 9m.	Well positioned as a location to service windfarms and tidal arrays in the Irish Sea including those in UK waters; Has experience in handling wind turbines / blades through the port for assembly on Arklow Bank. Jack-up barges have used port for deployment of wind turbines; Local service providers – Morrissey Engineering and Maintenance Ltd, Daralinn Training and Consultancy Company and Chevron Training. Port interested in future opportunities offered by offshore wind energy sector – parts of port would require some re-structuring and quay strengthening
Port of Waterford **CATEGORY B**	Port positioned 12km from open sea on River Suir; Facilities at Belview comprise 850m of port quay and 120m private quay; water depth 8-10m; Gantry and mobile cranes 40-50t; Can accommodate vessels up to 120m long; Support services include stevedoring, tugboats and workboats provision; Plans for extending port with additional 800m of quay and up to 13 acres of reclaimed land.; Further land close-by quayside could be made available; plans for creation of business park.	Well positioned to support marine renewable energy developments in Irish Sea i.e. wind farms and tidal turbine arrays; Port has handled wind turbines and renewable energy equipment. Experience company "Fastnet Shipping" based in Port of Waterford – operates specialised vessels and has provided services to UK wind farms as well as to Kish, Bray and Codling Bank windfarm sites; Port has identified offshore wind energy industry as potential source of business.

Port	Facilities and Infrastructure	Suitability – Offshore Renewable Energy Development
Galway Harbour **CATEGORY B**	In Galway City with six quays total length 1000m; Water depths average 3.0 m with Dun Aengus quays 3.6m; Gated docks for commercial vessels depth maintained at > 8m; Harbour channel 3.6m; Liquid, dry bulk and break bulk; Good support services with stevedoring, pilotage and mobile cranes available (40-100t). Quay space limited but 45 acres land available at nearby Enterprise Park; Marine tourism and leisure attractions; Volvo Ocean Race finish 2012; Port of call for cruise vessels (11 expected 2012); Ambitious plans for development of new deeper water harbour facilities to cater for cruise liner business, yachting marinas, marine research and technology facilities and offshore renewable energy sector	Strategic location for development of wave energy sector and marine technologies; experience with wave energy i.e. Wavebob test platform; Plans to expand Business Park to host SME's and businesses specialising in marine communications and data management, environmental sensors, wave energy converters and testing facilities and smart ocean data buoys; links to R&D and training NUIG, GMIT MI and IDA. Offshore renewable energy viewed as important areas for future commercial activity; Opportunities for existing harbour limited because of depth and insufficient quay space. The construction of the new harbour development over three phases (still in planning process) will significantly increase the commercial potential in all areas of maritime activities and is expected to take about 3 years.
Greenore Port **CATEGORY C**	Privately owned port at mouth of Carlingford Lough; Three main berths along 250m of quay space; Limited quay space but further hinterland available close-by; Mainly Lo-Lo, steel, animal feed and timber; Mobile and fixed gantry crane 40-100t. Operations based for tidal company "Open Hydro" with dedicated warehouse; Plans to upgrade port and extend the existing quay to 300m; New plans have been developed and submitted to expand the port and facilities	Strategic location in relation to offshore wind but limited opportunities due to current limitation son land area and quay space; Experience to date relate mainly to tidal power; Home base for "Open Hydro", who manufacture some of world's first tidal turbines. Port has handled heavy lifts with turbines onto vessels and has been involved in overhaul and maintenance of turbines which are undergoing field trials and tests. Good possibilities for operations and maintenance of offshore windfarms in Irish Sea if facilities can be expanded and more extensive land banks made available
Drogheda Port **CATEGORY C**	Two quay areas, inner north quays and deeper water facilities at Tom Roes Point terminal; Inner port quay 430m long handling bulk (grain, steel, timber); Tom Roes berthage quay 160m long with depths of 5.5m. Mobile cranes available up to 64t lift with larger projects handled if need be. Open storage behind quay of 84,000m2; Support include stevedoring, craneage, maritime services, pilotage and workboat availability	Limited experience with the offshore renewable energy sector; Access to the port is restricted with regards to depth and tidal range and is located about 5 km from the open sea. No plans to expand infrastructure or facilities to cater for renewable energy sector; Promoters of a new port development to cater for offshore renewable energy development in the Irish Sea –Bremore Ireland Port.
Port of Arklow **CATEGORY C**	Small coastal port, fishing and cargo vessels; 4 berths of 80m long and depths of 4.0m; Limited quay space and hinterland available with restricted channel access at low water; Local mobile cranes for cargo lifting work up 25 – 100t; Port has pilot boat and RNLI operations and local services including stevedoring, chandlers and boatbuilding "Arklow Maritime Services Ltd"; Headquarters of Arklow Shipping; Offices of GE Wind Energy; Roadstone Group outside port-deep water jetty 8.0m with significant hinterland.	Experience in offshore renewable energy; nearest port to Ireland's first windfarm on Arklow Bank; Port has handled wind turbines and various vessels associated with windfarm installation including jack-up barges, anchor handling tugs and cable laying vessels; Limited space and quay space for major offshore energy developments but could be a service port for nearby Arklow Bank farm; Local work catamarans built by Arklow Maritime Services Ltd. to service Irish Sea windfarms; Potential for Roadstone site to be developed as a location for operation, maintenance and servicing of Arklow Bank offshore wind farm.

PART III

Ports and Harbours in Northern Ireland

Port of Londonderry

Background

Londonderry port is a vibrant and rapidly developing facility located at the southern end of Lough Foyle at Lisahally, close to the small village of Strathfoyle. In the past, Londonderry had a thriving ship building business (wooden clippers) and later iron vessels were built in the Foyle Shipyard. It was an important port for exporting of cattle, agricultural products and linen to Scotland and mainland UK. The Port played a key role during World War II as a support base for allied vessels during the Battle of the Atlantic.

VESSELS UP TO 52,000 (DWT)

The port's main activities are focused on Lo-Lo operations and bulk including coal, grain, timber, minerals and oil. There is deep water alongside the main jetty which can cater for vessels of up to 52,000 dwt depending on tides.

24 HOUR A DAY MARINE ACCESS

Londonderry Port has been catering for cruise vessels since 1995 and has nine cruise ships booked to dock at the port in 2012. The port has also been involved in improving the berthing facilities at the Foyle Marina in the City and which hosted the yachts of the "Clipper Round the World Yacht Race" during the summer of 2012.

The Port of Londonderry is close to wave and tidal resources in the north-east and north-west Ireland but is somewhat removed from the main wind farm sites off the east coast and in the Irish Sea. Londonderry Port and Harbour Commissioners manage, maintain and administer the port and place strong emphasis on sustainability, re-investment of profits and growth.

105,000m OF QUAY SPACE

Port Infrastructure and Facilities

The Port of Londonderry operates one main jetty at Lisahally which is approximately 440m long. There is relatively deep water berth pocket alongside the jetty at 9.5m CD and extensive working area available of about 105,000m2 adjacent to the quay. There is further land area (approx.12, 140m2) within 500m of the main jetty. The Port mainly deals with Lo-Lo and bulk cargoes and provides a good level of support in terms of stevedoring, pilotage and craneage. Three tugs are available with bollard pulls of between 11t and 42t. The port currently operates four large mobile cranes of 40-45t and two smaller 10t mobile cranes. Heavy lifts cranes (up to 100t) can be provided on a case by case basis for specific cargoes.

The Port of Londonderry has 24 hour access and can accommodate vessels up to 6000dwt with maximum drafts of 7.0m. The approach to the port is via a main channel which is maintained at a depth of 8.0m CD. The port is strategically located close to a good road network that provides easy access to all major routes.

FIGURE 13. UNLOADING WIND TURBINE BLADES AT PORT OF LONDONDERRY.

Port of Londonderry and the Offshore Energy Sector

The Port of Londonderry has limited experience in working with the offshore renewable energy sector. However, batches of wind turbines and blades including associated equipment through the port have been imported through the post in the past (Figure 13).

Future Strategy – Offshore Renewable Energy Sector

At present, the Port of Londonderry has no specific plans to develop business activities with the offshore renewable energy industry nor does it have a strategy in place to improve infrastructure and facilities to attract developers. In terms of offshore wind energy, the port is located a considerable distance from the main development sites in the Irish Sea. However, future opportunities may exist as a service centre for wave energy and tidal resources along the north and north west coasts of Ireland once areas have been designated and the technologies and wave energy converter and tidal generator prototypes have been developed and tested for commercial development.

Information

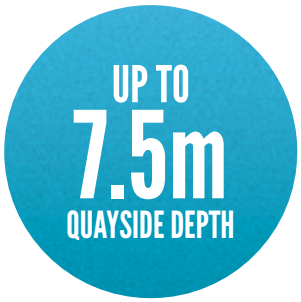
Further information of Londonderry Port and Harbour including its history, cargo and marine operations, towage, and its cruise and marina facilities can be obtained for its website: www.londonderryport.com

Conclusions

The Port of Londonderry is close to wave and tidal resources of the north west and north coast of Ireland (>50km) but is a considerable distance from the offshore wind sites in the Irish Sea (> 200km). It has good facilities and infrastructure and could offer potential as a future supporting port for servicing and maintenance of wave and tidal energy generating devices. At present, the port has no strategy or marketing initiative in place for facilitating the development of marine renewable energy. This may change later depending on interest expressed in port by offshore renewable energy developers and on the future

FOR THE PURPOSE OF THIS ASSESSMENT, THE PORT OF LONDONDERRY HAS BEEN CLASSIFIED AS A **CATEGORY B** FACILITY.

Port of Larne



Background

The Port of Larne is one of the premier ferry ports in Ireland operating up to 38 sailings per 24 hour day (Figure 14). It provides an essential gateway into Scotland, England and Europe for both tourist and commercial traffic with the fastest and shortest links. It has state-of-the art port facilities and caters for all cargo requirements including bulk. Its chief routes are operated by the P&O Irish Sea Line (Larne-Cairnryan and Larne-Troon) and the Stena Line (Larne-Fleetwood). The port handles a large number of passengers, commercial vehicles and tourist vehicles and has over 8500 ship movements per year. It has excellent road and rail links. The Port also hosts occasional visits by cruise liners and its location offers access to many of the historical, cultural and scenic areas in Northern Ireland.

The downturn in the economy has impact the port in recent years and management are interested in expanding their portfolio into other areas of business apart from the ferry services.

In relation to offshore renewable energy developments, the Port of Larne is close to tidal resources around the north east coast of Ireland and to offshore wind sites in the north Irish Sea and western Scottish waters. The Port of Larne is operated by P.O. Ferries Holdings (Dover, UK) and is owned by a Dubai company.

Port Infrastructure and Facilities

The Port of Larne is primarily a Ro-Ro facility and operates 4 berths, three of which have twin level ramps allowing double-deck ferries to load and discharge at both levels simultaneously. It is capable of handling wide and heavy loads up to 180t.

There are 4 main quays i.e. Mac Kean, Continental, Chaine and Curran with depths ranging from 6.0 to 7.5m CD. The quays can accommodate vessels up to between 135m and 170 m in length with a maximum beam of 30m. The entrance channel to the port is 8.4m CD. It has over 10,000m2 of hard standing areas available close to the berths, much of which is used for storage, marshalling and movement of vehicles. The Port has also access to considerable development land nearby.

One quay (Curran) is also used for Lo-Lo activities and there are mobile cranes available up to 32t capacity. Services are available locally to support the Port of Larne including tug boats, stevedoring, ship's agents and repairs and warehousing.

Port of Larne and the Offshore Energy Sector

The Port of Larne has no significant history in relation to the offshore renewable energy sector although it has imported wind turbines through the harbour in the past from Scotland for windfarm sites in Northern Ireland.

FIGURE 14. AERIAL VIEW OF PORT OF LARNE.

Future Strategy – Offshore Renewable Energy Sector

The Port of Larne has no development or marketing strategy in relation to the offshore renewable energy sector. Although it is interested in possible future developments in this area, its core business is focused on its passenger ferries and Ro-Ro activities and is likely to remain so for the foreseeable future. However, it does occupy a good location to service tidal and offshore wind energy sites around the north east coast of Ireland and Scotland. Its ability to service a major offshore renewable energy development is currently limited and further restructuring of the port and its facilities would be required to take full advantages of opportunities including making available additional land for development.

Information

Port of Larne Brochure – A breath of fresh air: Ireland's premier port for business or pleasure: Fact and Port Information Sheet; Website: www.portoflarne.co.uk

Conclusions

The Port of Larne is close to potential wind, wave and tidal energy sites off the north and north east coast of Ireland and Scotland It is also within 150km of some existing and planned windfarms in the north part of the Irish Sea and off the Antrim coast. Port infrastructure is focused mainly on the Ro-Ro sector and the port has no significant history with the offshore renewable energy sector. At present, there are no plans to develop parts of the ports to specifically cater for this industry. However, due to the economic downturn, management are now considering options of making available a multipurpose cargo quay for other uses including use by offshore wind energy developers. Although future potential exists for the port as a possible service and maintenance base for the offshore renewable energy sector, considerable restructuring of existing facilities and a requirement for further land would be needed.

THE PORT OF LARNE HAS BEEN CLASSIFIED AS A **CATEGORY C** FACILITY FOR THE PURPOSE OF THIS STUDY.

Belfast Harbour

Belfast Harbour / Harland and Wolff

2.0 MILLION
TONNES OF CARGO

1.3
MILLION
TOURISTS/PASSENGERS
ANNUALLY

£50 MILLION
WINDFARM HUB FACILITY

Background

Belfast Harbour was established in 1847 and is the principal port of Northern Ireland. The harbour estate covers some 2000 acres representing about 20% of Belfast City. It is also the primary logistics and distribution hub and home of major businesses including Microsoft, Harland and Wolff (H&W) and Bombardier.

The activities of the port centre mostly on liquid bulk dry bulk, break-bulk, Ro-Ro and a Lo-Lo container service. In the case of liquid bulk, Belfast Harbour imports over 2 million tonnes annually (petroleum products, diesel, heating oil). Dry bulk comprised mostly grain and animal feed for the agri-food industry with over 4 million tonnes imported in 2011. Break-bulk imports consist mainly of paper, timber and steel products. The Ro-Ro business comprises of three ferry terminals operated by Stena Lines and the Isle of Man Steam Packet Company. Ferries carried about 1.3 million passengers in 2011 and 350,000 passenger vehicles with the vessels providing important links to Scotland, NW England and the Isle of Man. Belfast Harbour is also Northern Ireland's principal container handling port with two terminals that link to the UK and European hubs such as Rotterdam, Antwerp and Le Havre. In 2011, the port handles over 129,000 containers. The port also caters for passenger liners and cruise ships with 41 vessels expected to dock in 2012.

Belfast Harbour has extensive waterfront and inland sites of over 150 acres. It has a large area of modern logistics warehousing and good connections to the hub of Northern Ireland's motorways. In recent years, considerable funds have been invested in building port capacity and infrastructure, the latest being the development of a £50 million windfarm hub facility at their D1 site for DONG Energy to assemble turbines and service windfarm sites in the Irish Sea.

Harland &Wolff has over 150 years of experience in marine manufacturing and specialised heavy industries including engineering, ship design, vessel building and repair and also operates as an offshore wind farms logistic base. It is well positioned to support the needs of the maritime, offshore and marine renewable energy sectors.

FIGURE 15. AERIAL VIEW OF BELFAST HARBOUR.

Infrastructure and Facilities

Belfast Harbour is a large port with extensive quay facilities including Stormont Wharf (580m quay and 10.2m water depth) and over 30,000m2 of hinterland (Figure 15).

Harland and Wolff shipyard has also extensive drydock and quayside facilities i.e. Main Dock (556m quay x 93m wide) and Belfast Dock (335m quay x 50m wide).It also has other facilities including a 432m long ship repair quay and 170m long outfitting quay with water depths of 8.6m CD. In addition, the H&W site has extensive hinterland available for handling project cargoes with up to 100,000m2 available at the main site.

Excellent levels of infrastructure and support services are offered through several companies. These include pilotage with up to 5 tugs with bollard pull ranging from 13.5t to 45t, various workboats and stevedoring. Heavy lifts are frequently performed in Belfast Harbour using mobile cranes.

The H&W site is well served for heavy lifting and has two large Golliath cranes at Main Dock (840t) along with four support cranes (2x 60t and 2 x 80t). At Belfast Dock, two cranes of 40t and 80t are available. At the ship repair facility, two 40t cranes operate and one 9t crane that services the outfitting quay.

Belfast Harbour / Harland and Wolff and Offshore Energy Sector

Belfast Harbour in partnership with Harland & Wolff (H&W) has had considerable experience with the offshore energy sector. It has been the assembly base for a number of UK Round 1 offshore installation contracts and a logistical base for the Ormonde offshore windfarm. The quarter scale Wavebob device was manufactured at the yard for later deployment in a Galway Bay test site. H&W was also the mobilisation port for the installation of the MTC tidal energy device in Strangford Lough. H&W have over 40 years of involvement with the offshore oil and gas sector in designing and manufacturing offshore foundations and accommodation components for rigs. The dockyard has facilitated as a logistics and feeder port in relation to the Robin Rigg offshore windfarm – Solway Firth (60 turbines – 3MW). During this project, H&W provided services related to storage, assembly, and offloading components onto delivery jack-up rigs including monopiles, hubs, nacelles, blades and other supporting equipment.

In recent months Belfast Harbour / Harland and Wolff have secured a major contract with the Danish company DONG Energy and its partner ScottishPower Renewables to assemble and install turbines for three offshore windfarms in the Irish Sea. This development has received consent from the Crown Estate and currently places Belfast Harbour as the leading port for this developing sector in these islands. As part of the project, it will construct a 50 acre assembly and logistic base to support this enterprise and will represent a £50 million investment, the largest ever in the Harbour's 400 year history. DONG Energy, the world's most successful offshore wind developer will lease the new facility on a long-term basis from Belfast Harbour. The assembly site will place Belfast Harbour / Harland &Wolff at the centre of windfarm developments in the north Irish Sea and Scotland and is expected to play a lead role in the development of a 600MW wind farm to be developed off the coast of Co. Down.

Future Strategy – Offshore Renewable Energy Sector

Belfast Harbour / Harland and Wolff have taken a strategic decision to play an active role in the development of the offshore wind energy sector in the Irish Sea. The harbour is ideally placed to service the sector with its high level of infrastructure and services available. It has a clear strategy to take advantage of the business opportunities associated with the installation of several large windfarms in the Irish Sea over the next 3-5 years and is marketing its facilities as a premier European hub for assembly and installation of offshore windfarms. As part of its commitment, it has invested significant funds into the construction and development of a new 480m quay and 50 acre logistics space for the pre-assembly of both turbines and foundations. The new quay will have water depths of up to 11.5m depth (dredged out pockets) with a re-enforced seabed area that will cater for 3 large jack-up barges at a time and specialised vessels onto which turbines will be loaded. The quay will be built to take pressure of 15t/m2. It is expected that the new facility will be completed by the end of 2012 and become fully operational in 2013.

Information

Further information on the history, facilities and services offered by Belfast harbour and Harland and Wolff (H&W) are available on the following websites: – www.belfast-harbour.co.uk and www.harland-wolff.com. Hardcopy brochures, information leaflets and reports are also available from Belfast Harbour Offices and H&W company headquarters.

Conclusions

Belfast Harbour along with the Harland and Wolff complex is strategically located within a radius of 150km to existing and planned windfarms in the Irish Sea and west Scottish waters. It is also within 50-100km of some of the best tidal energy sites along the north east and east coast of Ireland. It has an excellent combination of extensive facilities, infrastructure and support services along with the necessary engineering skills to facilitate marine renewable energy developments. The Harbour is actively involved in the marine renewable energy business and has been the assembly base for a number of UK Round 1 offshore installation contracts. It is currently constructing a major hub for the assembly, operation and maintenance of windfarms in the Irish Sea and has invested over €50 million with partners DONG Energy to build a new 450m quay and a 50 acre logistics base for the pre-assembly of both turbines and foundations. The facility is expected to be operational in 2013 and will be well positioned to serve as a key port for assembly and installation of new offshore windfarms planned by the UK and the Northern Ireland government for designated sites in the Irish Sea. The construction and operation of the facility is expected to create up to 300 fulltime jobs of which 150 will be in construction.

BELFAST HARBOUR / HARLAND AND WOLFF ARE REGARDED AS A **CATEGORY A** PORT FACILITIES FOR THE PURPOSE OF THIS ASSESSMENT.

Warrenpoint Harbour

750m
OF QUAY LENGTH

30,000m²
QUAY FRONT STORAGE

100t
CRANEAGE
(MOBILE & FIXED)

Background

Warrenpoint Harbour is Northern Ireland's second port and is strategically located at the head of Carlingford Lough halfway between Dublin and Belfast on the East Coast Economic Corridor (Figure 16). It is less than one hour drive from Dublin and Belfast and has excellent road links. The harbour is situated about 15 km from the mouth of the Lough about 5 miles south of Newry on the eastern shore. Activities of the port are focused primarily on Ro-Ro and Lo-Lo container traffic mainly to the UK mainland. There are twice daily Ro-Ro services and twice weekly container services. Products include timber, steel, recyclables and grain. The port has approximately 2.6 million tonnes throughput in 2010.

Recent major investment (£22 million) have provided a new Ro-Ro berth and 2 new deep water quays to facilitate Irish Sea and Continental routes. SeaTruck Ferries Ltd is a major Ro-Ro operator working out of Warrenpoint Harbour.

Port Infrastructure and Facilities

The port has seven berths with a total quay length of 750 meters. Over 300m of the quay has been dredged to 7.5m below CD and the remainder of the berths are dredged to a depth of 5.45m CD. The maximum tidal range at the port is 5.3m. There is a Ro-Ro ramp (39m x 27m) with design loading of 120t. There is good working space along the quay mainly dedicated to core business activities and up to 30,000 m2 of quay front storage. It is well connected to road services with improved traffic movement through Newry as a result of new road developments.

The port has 5 harbour cranes ranging from 20t to 100t lift capacity and a variety of other specialised lifting equipment such as reachstackers and shunters. These include two 43t and 100t Mobile crane and three harbour cranes of 20t, 25t and 40t each.

The port is fully supported by qualified stevedores along with a shipping agency, bunker and provision service and local light engineering firms.

Vessels access Warrenpoint at most stages of the tide through a narrow channel which has a depth of 5.4m CD. The maximum tidal range is 5.3m.

FIGURE 16. AERIAL VIEW OF WARRENPOINT HARBOUR.

Warrenpoint Harbour and the Offshore Energy Sector

Warrenpoint Port has limited experience with the offshore energy sector although wind turbine generators have been imported through the harbour. Recently, a company "Tide Masters Ltd" has established premises at the port to manufacture composite tidal turbine components for export.

Although there are limited potential for construction activities associated with major offshore renewable energy projects, there are suitable opportunities in the operations and servicing sector for offshore wind farms given that Warrenpoint Harbour is close to designated site locations in the north Irish Sea. To this end, the Port has been recently involved in marketing this potential in association with Invest Northern Ireland.

Future Strategy – Offshore Renewable Energy Sector

Warrenpoint Port Authority is considering partnership with offshore windfarms as a viable business activity in the future and has identified the sector as a possible area for development. However, it has no defined strategy in place to develop or market the port as a base for operations and maintenance of offshore windfarms in the Irish Sea. The port is considering acquiring further land area for development to the north of current quay to expand its operations which would allow for the possibility of offering a long-term lease to developers for the management and servicing of offshore windfarms. The core business however is likely to remain Lo-Lo and Ro-Ro activities to and from the UK mainland and continental Europe for the foreseeable future.

Information

Warrenpoint Port has an excellent website which provides all the details of the port activities, infrastructure, services, and operations. See: www.warrenpointharbour.co.uk

Conclusions

Warrenpoint Port is within 50 – 120km of existing and planned offshore windfarm off the north east and east coast of Ireland and in UK waters in the north Irish Sea. The port has good infrastructure that could act as a base for offshore windfarm operations, maintenance and ancillary services. There could also be opportunities for tidal energy developments. At present, there are limited facilities and no strategic plans has been developed to target the offshore renewable energy sector. Port authorities are willing to explore this further and work with renewable energy developers on leasing port land or extending existing quayside space.

WARRENPOINT PORT HAS BEEN CLASSIFIED AS A **CATEGORY B** PORT IN TERMS OF MEETING THE REQUIREMENTS OF OFFSHORE WINDFARM DEVELOPERS.

TABLE 3. SUMMARY OF NORTHERN IRELAND'S PORT FACILITIES AND INFRASTRUCTURE AND SUITABILITY FOR MEETING REQUIREMENTS OF THE OFFSHORE RENEWABLE ENERGY SECTOR

Port	Facilities and Infrastructure	Suitability – Offshore Renewable Energy Development
Port of Londonderry **CATEGORY B**	Port located at Lisahally and has one main quay 440m long with deep water berth pockets alongside up to 9.5m. mainly Lo-Lo and bulk cargoes with good levels of support with stevedoring, four mobile cranes 40-45t and heavy lift up to 100t if required; Tugs and pilotage available with approach channel maintained at depth of 8m; Extensive working area available (105,000m2) at quay with further land (12,140 m2) close-by.	Close to wave and tidal resource site along north and north west coast; Limited experience in ocean energy sector; Has handled importation of wind turbines and blades; Overhead cables may hinder installation of offshore wind turbines on jack-up barges; Considerable distance from open sea; Port has no plans for developing business activities with offshore renewable energy industry; Possible that opportunities may be pursued in future.
Port of Larne **CATEGORY C**	Privately owned Ro-Ro port with 4 main quays with depths ranging from 6.0 to 7.4m that can accommodate vessels of between 135 and 170m in length; One quays dedicated to Lo-Lo activities with mobile cranes, tugs and stevedoring; Over 10,000m2 hardstand area used for storage and movement of vehicles	No significant history in relation to renewable energy sector apart for importation of some wind turbines. Good location in relation to offshore wind and tidal energy development off NE coast of Ireland and Scotland; Limited ability to service major offshore renewable energy developments with further restructuring and land availability required.
Belfast Harbour / Harland & Wolff **CATEGORY A**	Extensive quay facilities (1,880m) and water depth (8-10m); Hinterland of over 130,000m2; Various heavy lift gantry and mobile cranes; Strong traditional experience in marine manufacturing, heavy industries including engineering, ship s design and vessel building and repair; Investment of £50 million to construct offshore wind energy hub in partnership with DONG Energy; close to City with services and transport links	Well positioned to support needs of the maritime, offshore and marine renewable energy sector especially offshore wind farms in the Irish Sea. New developments will make Belfast Harbour / Harland & Wolff a major hub and base for importing, assembly and installation of wind turbines to be completed end of 2013 – also potential base for development, deployment and testing of tidal turbines: R&D, training, QUB, UU and Regional Colleges
Warrenpoint Port **CATEGORY B**	Port located in Carlingford Lough; mainly Ro-Ro with some Lo-Lo i.e. timber, steel recyclables and grain; Seven berths along 750m quay space with over 300m dredged to 7.5m deep; Over 30,000m2 quay front storage; various cranes with lift capacity from 20-100t. Stevedoring services and light engineering including "Tide Masters" who manufacture components for tidal turbines. Port access limited at low tide through narrow channel with depth restriction of 5.4m	Limited experience with offshore energy sector; some imports for wind turbines for land based operations; Good opportunities for operations and servicing sector for offshore wind energy sector given its close proximity to sites in Irish Sea. Could also be development opportunities for tidal energy devices and operations associated with servicing tidal turbine arrays? Port willing to work with renewable energy developers on leasing port land or extending existing facilities to accommodate requirements

PART IV

Summary Information on some UK and German Ports currently used by the Offshore Renewable Energy Industry

THE PORT of MOSTYN LIMITED

Port of Mostyn: North Wales (Irish Sea)

VESSELS UP TO 18,000 (DWT)

1,300t LEAVY LIFT CRANE

75 ACRES OF LAYDOWN FACILITIES

Background

The Port of Mostyn is privately owned and operated and is located in North Wales at the entrance to the River Dee on the south bank of the estuary. It has good road links to the UK motorway networks and to the international airports of Manchester and Liverpool. There is a direct rail link also to Holyhead. The port handles a variety of cargoes such as timber, finished steel, animal feeds, fertilisers, aggregates and cement for the regions agriculture and manufacturing industries. In recent years, the port has undertaken a major development programme including the construction of a Ro-Ro terminal and a purpose berth for loading wings for the A380 Airbus. This development has enabled the port to meet the changing needs of its customers from unitisation to project cargoes. The creation and expansion of facilities has enabled the Port of Mostyn to become a major player as a base for the Offshore Windfarm construction and maintenance industry.

Port Infrastructure and Facilities

The Port has a 310m long riverside quay with a depth of 6.5m at low tide and 65 acres adjacent to berth for cargo storage. It can accommodate vessels of up to 18,000 dwt which can remain afloat at all stages of the tide. There is also an 180m long RoRo berth with a 225 tonne capacity Linkspan. This berth can accommodate vessels of up to 170m LOA and with drafts of up to 6m. Consent to extend the Ro-Ro berth into a multi-purpose riverside solid quay was granted in 2010.

Activities include specialist cargo handling and work associated with offshore wind farms. The Port of Mostyn has an experienced workforce on site for discharging and handling windfarm components and on-shore assembly including craneage and operators, stevedoring, and wind turbine technicians

Port of Mostyn and the Offshore Wind Energy Sector

The Port is ideally positioned to carry out operations and maintenance work on windfarms in the Irish Sea. To date the construction of six offshore windfarms North Hoyle, Burbo Bank, Robin Rigg, Rhyl Flats, Walney 1, Walney 2 have been undertaken from The Port of Mostyn, with the most distant (98 nautical miles) being the Robin Rigg project located in the Solway Firth between the Cumbrian and Scottish coasts.

The developers Vestas Wind Technologies Ltd and Siemens Wind Power A/S currently use the Port as their service base for North Hoyle and Rhyl Flats windfarms. The next generation 160 turbines Gwynt-y-Mor offshore wind farm is one of the largest in the world (576MW). It is presently under construction and will be completed in 2014. It will be located about 20km from the North Wales coast and the developers (RWE Npower) will be using the Port of Mostyn as its main base for both the turbine assembly works and the O&M operations.

The Port has become a major player as a base for offshore windfarm construction and support services in the Irish Sea. Six construction projects have already been undertaken. The Port has extensive lay-down facilities (75 acres) adjacent to the riverside quays which provide a solid base required by developers in construction and servicing the offshore windfarms. It has heavy lifts of up to 1,300t, (crawling crane) along with capacity for turbine component storage, fitting out bays and 6000 m2 of final assembly workshops and space for storage of electrical components.

The berths at the port are well suited to the safe operation of large jack-up vessel such as the "Excalibur", "Resolution", "Goliath" and "Sea Worker" all of which have successfully used the port during various windfarm construction projects. Turbine components for the Walney 1 and Walney 2 windfarms were also unloaded at the Port of Mostyn in 2011, some delivered to the Port be RoRo vessels.

Future Strategy for Port Development

Construction and O&M operations are now the main activities at the Port. With six offshore wind farm projects already successfully undertaken, the port is both favourably situated and has the necessary track record and experience to undertake the demanding requirements of offshore windfarm construction maintenance and servicing.

Information

The Port of Mostyn has a comprehensive website www.portofmostyn.co.uk which details the facilities and infrastructure, cargo handling, marine service agencies and major developments undertaken. It also provides an account of the services and support to the offshore wind energy sector and up to date news of latest developments in port business.

Conclusions

The Port of Mostyn is a key operations and service centre for the offshore windfarm energy sector in the eastern Irish Sea. Because of its initial success as an operation base for the North Hoyle and Rhyn Flats windfarms, RWE npower renewables have chosen the Port of Mostyn as its construction and O&M base for the large Gwynt-y-Mor windfarm. This $2 billion investment in Gwynt- y- Mor will create over 100 long-term skilled engineering jobs and 150 construction jobs and is worth over £50 million to the port over the lifetime of the windfarm. Existing clients that have used the Port of Mostyn include RWE npower, Siemens Wind Power A/S, Van Oord Offshore, Vestas Wind Technology and DONG energy. One of the recent benefits of the windfarm business to the Port of Mostyn is the attraction of new ancillary businesses into the area. These include diving, subsea engineering, workboat providers, steel fabrication and engineering workshops.

Port of Barrow-in-Furness: West Coast England (Irish Sea)

VESSELS UP TO 10,000 (DWT)

2,690m OF QUAYS

UP TO 7.9m DEPTHS

Background

The Port of Barrow is an enclosed dock system within the town of Barrow-in-Furness on the west coast of England. Morecambe Bay is to the east of the port and the Irish Sea surrounds it to the south and west. The port if privately owned and operated by Associated British Port Holdings with some land shared with BAE Systems Submarine Solutions. The port is well suited to serve the shipping routes to Ireland, mainland Europe and the north Atlantic.

Barrow has one of the largest shipyards in the UK and is only rivalled by Belfast, Birkenhead and Tyne. It is also the country's only submarine production facility. The port is heavily involved in the energy sector and the transport of natural gas and other forms of energy from local sites such as Sellafield, Rampside gas terminal and the Roosecote Power Station. The Port of Barrow is also operational base for a number of offshore windfarms such as the Barrow Offshore Wind farm, the Ormonde Wind farm and the Walney offshore wind farms. The port has significant exports of nuclear materials, oil and gas as well as limestone and granite. Much of its imports are sand aggregates, wood pulp and steel. Barrow is also becoming increasingly popular as a port of call for cruise liners for passengers wishing to visit the Lake District.

Port Infrastructure and Facilities

The Port of Barrow consists of four large docks, Buccluech Dock, Cavendish Dock, Devonshire Dock and Ramsden Dock and is one of North West England's most important ports. It is the country's only deep water port between the Mersey and the Clyde.

The Port of Barrow has a total port acreage of 138 acres and handles about 350,000 tonnes of materials per year. Much of this is dry bulk and forestry products with over 60,000 t of wood pulp handled annually, while the liquid bulk comprise mainly of condensate (liquid by-product) from nearby Centrica's gas terminal. The port has a quay length of 2,690 m and can handle vessels of 150m long and 35 m beam. The quay has relatively deep water (7.9m) alongside and can accommodate vessels with up to 10m draft and 10,000 dwt. The channel depth is 11.0 m.

There is a highly skilled workforce associated with the BAE Systems ship-building facilities, which include vessel design, building and commissioning. There are Ro-Ro berths with designated heavy/abnormal load route from port to M1 motorway and there is a direct connection to the national rail network. The Port has also specialised skills in handling nuclear fuel carrying vessels from a dedicated terminal. Multi-purpose vessels are available to carry out hydrographic surveying, buoy handling, bed levelling, towage and marine environmental work.

Port of Barrow-in-Furness and the Offshore Wind Energy Sector

The Port of Barrow has much experience with the offshore wind energy sector and is only 18 km from the proposed 4.2 GW Round 3 site in the Irish Sea. It has undertaken the heavy lifts including monopiles and transition pieces for Walney 1 and Walney 2 offshore windfarms. Sub-stations for the Barrow, Robin Rigg and Ormonde offshore windfarms were constructed on the quayside prior to load-out and installation on site. The port is well experienced in handling pipeline, towers and load-out operations and acts as a centre to support and service renewable energy products.

Port of Barrow is the official onshore operations and maintenance base for the Ormonde Offshore Wind Farm (Vattenfall) which comprises 30 5MW turbines located about 10 km off Barrow-in-Furness. The port was also used as the logistical centre for handling essential components and turbines of the Walney 1 and 2 windfarms with 18 acres contracted to DONG Energy. The windfarm consists of 102 turbines which were installed in 2 phases at a cost of €1.3 billion. The project delivers about 367MW of power. Further expansion of Walney 2 is expected in 2014 where capacity will be increased by a further 750 MW which will make the windfarm one of the largest in the world. Turbines installed at Walney 2 have a rotor diameter of 120m and are 137m tall to the tip of the blade. Monopiles are place 30m deep into the seabed and are 56m tall and weigh 550t.

Future Strategy for Port Development

The Port of Barrow-in-Furness intends to continue to meet the requirements of the offshore wind energy sector and views the business associated with the operations, maintenance and servicing of the offshore windfarms i.e. Walney 1-2 and West of Duddon Sands as a valuable source of income and local employment. The port has developed an action plan to examine the potential of the docks and waterfront areas for marine leisure, tourism and wildlife reserves as well as business and accommodation centre.

Information

Details on the history, infrastructure, facilities and activities of the Port of Barrow-in-Furness including the developing offshore wind energy sector can be found in the website www.abports.co.uk.

Conclusions

The Port of Barrow-in-Furness is an important centre for operations and maintenance of offshore windfarms in the region i.e. the Ormonde and Walney 1 and Walney 2. More recently the port been selected as the O&M centre for the West of Duddon Sands offshore windfarm (389 MW) which will be positioned about 14km south west of Barrow-in-Furness. This $1.6 billion operation by Scottish Power Renewables and DONG Energy will create 60 jobs locally and will be completed by 2014. Much of the installations and assembly operations will be run out of Belfast Harbour.

Port of Ramsgate: South East Coast of England (North Sea)

500,000
CONTAINER UNITS ANNUALLY

5 MILLION
FERRY PASSENGERS PER YEAR

DEDICATED WINDFARM
O&M HUB

Background

The Port of Ramsgate is situated in the south east corner of England with easy access to the North Sea and English Channel. The port represents a niche facility capable of handling passenger traffic and freight market. It offers easy access to mainland Europe with up six ships operated by TransEuropa making up to twenty ferries crossings a day operating between the Channel port and Ostende, Belgium. The port has one of the finest marinas on the south east coast "Royal Harbour Marina" with over 700 berths for yachts and boats. A part of the port acts a centre for operation and maintenance of the Thanet and London Array windfarms which are located close-by off the coast of Kent.

Port Infrastructure and Facilities

The Port is set on a 32 hectare site of dedicated land and has three modern Ro-Ro bridges capable of accommodating conventional fast ferry freight services. Full passenger and freight vessel facilities allow the Port to operate and service three berths simultaneously and handles up to 500,000 freight units and 5 million passengers each year. The Port can accommodate vessels of up to 160m in length with 6.5m draft with no tidal restrictions. The main channel is 7.5m deep with pilotage required for vessels over 80m in length. It also has the capacity to handle multi-deck vessels, stern and quarter ramps. It has three berths and all the facilities of a modern 24hr/day Ro-Ro terminal with tugs, dedicated warehouses (2,000m2) for transhipment and storage.

The Port of Ramsgate also operates an aggregate import facility and can accommodate vessels of up to 60m in length carrying up to 1,200t of cargo. Much of the imports are crushed slag and limestone for the roads and construction industry. There is a dedicated port road which links to the dual carriageway and M2 motorway to London and national hubs. There is also a high speed rail service for ferry passengers between London and Ramsgate.

Port of Ramsgate and the Offshore Wind Energy Sector

The Port of Ramsgate has been the assembly site and transhipment centre for the Thanet Offshore Wind Farm, one of the largest in the world. A dedicate quay 280m was constructed to accommodate the loading assembly and storage of wind turbines. This farm is located about 11 km off the coast and was formally commissioned in September 2010. It is operated by Vattenfall and covers an area of about 35km2 in water depths of about 25m. It is expected to generate about 300MW of electricity under full capacity. The developers have paid for harbour dredging, new offices and warehouse facilities as part of the operations. A 40 year contract has been signed with the Port of Ramsgate which will provide a regular income and employment opportunities.

The largest offshore windfarm in the world, the London Array is currently under construction and is located about 20 km off North Foreland, Kent in the outer Thames Estuary. The first phase is expected to be completed end of 2012 at a cost of £2.2 billion and will deliver a capacity of 630MW. One of the major shareholders is DONG Energy and the 175 turbines will be supplied by Siemens.

The Port of Ramsgate has been selected as the construction, operations and maintenance base for the London Array offshore windfarm project. Part of the agreement includes the building of a new pontoon that will berth up to six service vessels. The Port of Ramsgate will a lease 8000m2 operations and maintenance site over 50 years and a 2,500m2 licensed site for a construction and management facility for the duration of the contract.

Future Port Development Strategy

Passenger ferries and Ro-Ro operations will remain the main focus of future development at the port along with the expansion of marine leisure and yachting activities. Business activities associated with the present and future servicing and maintaining offshore wind farms will remain an important part of the ports development strategy.

Information

Full details of the operations, infrastructure and facilities available at the Port of Ramsgate can be had on their website portoframsgate@thanet.gov.uk

Conclusions

The Port of Ramsgate has benefited significantly from investment generated by offshore windfarms in the area and is actively involved in facilitating and supporting operations and maintenance activities. The port is also looking into availing of future opportunities in relation to tidal and wave energy. Great expectations were initially had in terms of job creation where 90 direct and 200 indirect jobs were originally estimated. However, only 21 permanent jobs have resulted to date mainly because much of the construction and fabrication of turbines, towers and foundations are done elsewhere.

HumberPort

At the **Heart** of Britain's International Trade

Able HUMBER Port: East Coast of England (North Sea)

4,000m
QUAYSIDE FRONTAGE

327
HECTARE
MARINE ENERGY PARK

£400 MILLION
NEW PORT DEVELOPMENT

Background

Able Humber Port is situated on the east coast of England in the busiest trading estuaries in the country. It ranks fourth in size in northern Europe after Rotterdam, Antwerp and Hamburg. It is a central point for the import and export of products to large markets in UK and Europe and is located at the very best area for the servicing of Round 3 offshore wind farms. It is also a central point for support services for the North Sea offshore oil and gas activities. The Humber area is currently driving forward the development of renewable energy sector providing opportunities for business in wind energy, tidal technology, biofuels and biomass. Home to multi-nationals Centricia, International Power, ConocoPhillips, Total and BP, the Humber area currently lands and distributes 20% of the UK's natural gas and provides more than a quarter of the UK's refining capacity. Humber port also import over 30% of UK's coal supplying power stations that generate around 17% of the country's electricity.

Port Infrastructure and Facilities

The Port comprises 819 hectares of property and has deep water frontage of 4,000m. The main entrance channel is 180m wide and has a depth of 10.5m at MLWS. Able Humber Port undertakes a large amount of energy related activities and services and is a centre for Bioethanol production, Biomass power generation, container handling, storage and distribution, offshore drilling rig maintenance and upgrades, engineering services, LNG imports, fabrication of offshore oil and gas structures and vessel lay-up and repairs. In addition, the port is involved in the manufacturing of wind turbines, as well as wind turbine erection, testing and training. The port also hosts an array of service companies for handling shipping, transport, construction and operational activities. It also has all the necessary experience in terms of specialised skills in mechanical and electrical engineering, steel fabrication and other manufacturing services. The port is a market leader in decommissioning and recycling marine structures including oil and gas platforms and ships.

Port of Able HUMBER and Offshore Renewable Energy Sector

The Port of Able Humber is undertaking a major new development (£400 million) to make a state of the art facility for a one stop shop for North Sea offshore wind energy including construction, assembly, commissioning, installation and maintenance. Part of this development is the construction of a 327 hectare Marine Energy Park with 52 hectares of quay land. It will have 1,565m of new quay with a width of 350m. The development will also include an industrial quay 160m long with 50t/m2 heavy lift strengthened patches. Jack-up rigs and specialised vessels with used the quay space which will have depths of 11m CD. Cost efficiencies and logistics savings will be maximised through co-location of suppliers e.g. blades, towers and manufacturers of foundations as well as key suppliers of components, gearboxes, generators and nacelle canopies.

The Port of Able Humber Company intended to develop this specialised part of the port as the "Aberdeen" of offshore wind energy and become a base for the construction of turbines for huge windfarms planned for the North Sea under Round 3. It will be the operational and maintenance centre for the Humber Gateway Windfarm located about 15 km off the coast. This farm is to be completed in 2012 and will generate 220MW of electricity from 73 turbines with capacity of 3MW each. Furthermore, it is expected that future offshore wind farms planned for the Dogger Bank, Hornsea and Norfolk Bank area will require up to 5000 turbines to be installed over the next 5 years.

Future Port Development Strategy

The Port of able Humber is embarking on a £100 million port related logistics development on the south side of Humber which is expected to create up to 3000 jobs. The developments will include the creation of a transport depot, warehousing, storage areas, offices, a business park and a motel. This together with the £400 million planned Marine Energy Park and a £50 million investment to meet the requirements of offshore windfarm developers will greatly help to maximise jobs and wealth creation. The new quay will have deep water (8.5m), no navigation restriction and approved planning permission and also plans to include catering form other renewable energy production methods i.e. wave energy and the generation of energy from biomass. These developments will commence in 2012 and will be completed by 2015.

Information

Further details on the port facilities, infrastructure, access, marine energy, logistics and business parks, and the industrial zone can be found on the websites: www.ableuk.com and www.ablehumberport.com

Conclusions

The Port of able Humber is well positioned to play a major role as a hub for the offshore wind energy sector in the North Sea. Besides being the operational and maintenance centre for the Humber Gateway windfarm (220MW), it will also become the construction, assembly and operational base for future mega windfarms planned for the North Sea region under the UK round 3 agreements. Large investments have already been made to meet the requirements of offshore wind energy developers and to integrate skills, facilities and infrastructure in the form of a Marine Energy Business Park and Logistics Centre. It is expected that the developments associated with the construction and operation of the Marine Energy and Business Parks and the offshore wind energy sector will generate up to 3000 jobs in the short to medium term.

Cuxhaven: Germany (North Sea Coast)

250,000m
QUAYSIDE FRONTAGE

13.5–15.8m
DEPTH

90t/m²
REINFORCED QUAYSIDE

Background

The seaport Cuxhaven lies directly on deep water at the mouth of the River Elbe and has a quick route to the Baltic via the Kiel Canal. The harbour encompasses 319 acres in total, with 231 hectares being land and 88 hectares of water. The harbour is owned by and administered by the state of Lower Saxony. It is an important fishing harbour, the second largest in Germany. Cuxhaven is a multi-purpose port (mainly Ro-Ro) with an emphasis on the shipping and transfer of cargoes, Ro-Ro traffic (trailer and containers), commercial vehicles, frozen fish and bulk goods comprising mainly of construction material. The port is also an important location for the shipping of cars and for exporting fresh and frozen and fish.

In recent years, Cuxhaven has developed special infrastructural measures as an offshore base for the assembly of components and the construction and services for offshore wind farms in the North Sea.

Port Infrastructure and Facilities

Cuxhaven is an ultra-modern deep water terminal with six berths and a water depth of up to 15.8 m with versatile warehousing facilities. It is primarily oriented towards Short Sea Shipping and operates a network of Ro-Ro and container scheduled services to UK, Russia, Scandinavia, the Baltic States and Iceland. Cuxhaven is linked to an efficient European road and rail network.

The area and length of quays are as follows: – Terminal 1 (Europakai) area 245,000 m2 with berth length of 840m; and terminal 2 (Steubenhoft): area 18,000m2 and berth length 250m. Terminal 1 has 2 multi-purpose berths with 13.5 m water depth and two automatic Ro-Ro ramps. And one multi-purpose berth with 15.8m depth. Terminal 2 has one multi-purpose berth with water depth of 14.5 m and one berth with 8 m water depth. Both terminals are serviced with rail tracks and link to national rail system. The Port terminals have good craneage including a Liebherr 400 mobile crane with 100t lift and container gantry crane with a capacity up to 500t. Mobile cranes up to 500t lift are available at short notice. The Port has over 10,000m2 warehouse capacity included 5,500m2 of covered area for handling rail and truck traffic. There is parking space for 12,000 cars.

The Port of Cuxhaven and the Offshore Renewable Energy Sector

Cuxhaven is a leading location for production, assembly and the provision of logistic services for offshore wind turbines and has developed a unique branch cluster of offshore wind power and maritime industries. It has established efficient infrastructure and heavy loading equipment as a base port for the offshore wind energy sector and has a very competitive industry that is ahead of many of its rivals by 2-3 years. It has constructed special assembly and storage areas with very strong re-enforced quaysides (up to 90t/m2) which are suitable for the transportation of the completely assembled offshore wind energy equipment and future specialised components. Amongst the advantages and specialist facilities developed by the Port of Cuxhaven to support the offshore wind energy industry are:

- Heavy lift operations with special offshore platforms at deep water berth
- Handling capacity for approx. 1,500 tonnes of wind energy installations
- Deep water berths for handling large jack-up vessels
- Special cranes for setting up wind energy plants
- Key position for a large number of supply chains
- Short access to North Sea and Baltic Sea windfarms
- Special purpose concrete ring foundation for loading entire offshore units
- Excellent road, rail and shipping links to Europe

At present, three offshore wind farms are currently operating in German waters with some twenty more granted permission and a further twenty planned. By 2030, Germany intends to produce 25,000 MW of power from offshore wind energy equivalent to 20 nuclear reactors and has allocated about €5 billion in state aid for the sector.

Future Port Development Strategy

The Port plans to expand its resources and its facilities over the next few years to further meet the requirements of container traffic, car exports, fish and fish products, steel and aggregates as well as the offshore renewable energy sector. A start has been made on the special heavy load berth with a view to meeting the requirements of the offshore wind power industry and other heavy cargoes. From 2013 onwards, a fourth berth on Terminal 1 Europakai will be constructed which will offer an additional berth length of 290 m and an adjacent land area of 85,000m2 for the handling and storage of cargo. Development plans will see the Port of Cuxhaven becoming Europe's No.1 hub for offshore wind energy with an integrated cluster of leading companies based at the facility with other service providers. These include Ambau, GmbH (turbine towers and components), STRABAG Offshore Wind, Otto Wolff, and CSC Steel Construction (foundation manufacturers).

Information

Details on the Port of Cuxhaven, including its infrastructure, facilities, logistics, functions, shipping and transport statistics as well as its specialised facilities and services to the offshore wind energy industry are given in the following websites: www.cuxport.de; info@cuxport.de; www.afw-cuxhaven.de

Cuxhaven also has an Infopoint Offshore Base in the city which offers the public the latest information on the topic of offshore wind energy and climate protection, the port infrastructure at the offshore wind energy base in Cuxhaven, the training opportunities in the offshore industry as well as information on offshore companies located in the city.

The port area through the Offshore-terminals 1+II can also be viewed at close range which includes the heavy duty crane and platforms, the offshore companies AMBAU (production of tower segments) and CSC Ltd (production of the 500t BARD foundation tripods) and other offshore service providers

Conclusions

The Port of Cuxhaven is currently the main construction, assembly, operations and maintenance base for the offshore wind energy industry in the North Sea and the Baltic Sea. It has strategically invested in the industry following the decision by the German government to close of nuclear power stations in Germany. It has specialised facilities and infrastructure to meet the requirements of the sector and has a unique cluster of offshore wind power and maritime industries that caters for all aspects of the business including fabrication and construction of towers, turbines and foundations. The Port has facilitated the integration of business supply chain clusters and provides a favourable environment for communications between manufacturers, shipping companies, the port and service providers. Job creation at Cuxhaven, as a result of the developing offshore wind energy industry, currently ranges from between 1,700 and 2000 individuals. This is expected to increase to about 3000 by 2015. The port will play a major role as a key base for the development of Germany's offshore wind energy sector which has set a target of 245,000MW of electricity generated annually by 2030.

TABLE 4. SUMMARY OF SOME UK AND GERMAN PORT FACILITIES AND INFRASTRUCTURE CURRENTLY SUPPORTING THE OFFSHORE RENEWABLE ENERGY SECTOR

Port	Facilities and Infrastructure	Suitability – Offshore Renewable Energy Development
Port of Mostyn Irish Sea	Port on North Wales coast at entrance to River Dee; Riverside quays totalling 310m with design depth alongside -9m CD plus a 180m RoRo berth with a 225 tonne Linkspan and design depth alongside -8m CD. Work associated with offshore windfarms, port can facilitate jack-up barges, Ro Ro vessels, dry bulk vessels, commercial cargo vessels, coasters and tugs. Experience workforce in handling windfarm components and on-shore assembly with services including craneage, operators, stevedoring and wind turbine technicians; Extensive lay-down facilities (75 acres) adjacent to quaysides; heavy lift crane (1,300t) and port capacity for storage of turbine components and fitting out assembly.	Major player as a base for offshore windfarm construction and support services in the Irish Sea. Six windfarm construction project completed includingNorth Hoyle, Rhyl Flats Burbo Bank; Robin Rigg, Walney 1 and Walney 2.Major development Gwynt y Mor underway (2012) –largest windfarm in world (576MW); main developers include Vestas Wind Technologies Ltd, Siemens Wind Power A/S, RWE npower, DONG Energy and Van Oord Offshore. New businesses attracted to area including diving, subsea engineering, workboat providers, steel fabrication and engineering workshops; Over 150 long-term skilled engineering jobs created.
Port of Barrow-in-Furness Irish Sea	Privately owned port (Associated British Port Holdings) with four large docks (138 acres): most important north west England port and shipyard rivaling Harland and Wolff, Belfast: Hub for energy sector, nuclear, oil and gas and offshore wind; significant dry-bulk, forestry products, steel and aggregates; Quay lengths of 2,690m and can handle vessels of 150m; water depth up to 10m alongside quays; Highly skilled workforce and services including stevedoring, craneage infrastructure and vessel support; specialized handling facilities for nuclear industry, submarine building and abnormal loads.	Much experience with offshore wind energy sector: Port logistical centre for heavy lifts of monopiles and transition pieces for Walney 1 and Walney 2 offshore wind farms with 18 acres contracted to DONG Energy: Port of Barrow was sub-station for load-out and installation of turbines for Robin Rigg and Ormonde wind farms (Vattenfall); Well experienced in handling pipelines, towers and load-out operations with port acting as a centre to support and service renewable energy sector in the Irish Sea; Further installation and servicing expected associated with extension of Walney 2.
Port of Ramsgate North Sea	Port situated in south east corner of England: 32 hectare site dedicated mainly to Ro-Ro and fast ferry services to Belgium; An accommodate vessels up to 160m in length with 6.5m draft and no tidal restrictions. Can handle multi-deck vessels, stern and quarter ramps; modern Ro-Ro terminal with infrastructure, tugs, dedicated warehouses and storage facilities; operates aggregate import business.	Dedicated quay 280m for loading assembly and storage of wind turbines; Assembly and transhipment site for Thanet Offshore windfarm, one of Britain's largest; Capacity 300MW operated by Vattenfall; Selected as construction, operation and servicing base for London Array windfarm (630MW); DONG Energy and Siemens; Port to lease designated licensed sites to developers over 50 year period.

Port	Facilities and Infrastructure	Suitability – Offshore Renewable Energy Development
Able HUMBER Port North Sea	Large port situated on east coast of England; comprise 819 hectares and deep water frontage and quays 4,000m long; Wide entrance channel and water depths of 10.5 m at MLWS; Large amount of energy related activities-bioethanol, biomass, LNG, fabrication of oil and gas structures, vessel lay-up and repairs; manufacturing of wind turbines and array of service companies for handling shipping, transport, construction and operation activities. Location for large energy multinationals- Centricia, ConocoPhillips, Total and BP; Imports and distributes 20% of UK natural gas and provides 25% of refining capacity. Port provides considerable logistics savings through clustering and co-location of manufacturers, suppliers and services in marine offshore energy sector.	Ideally located for servicing of Round 3 offshore wind farms in North Sea. Dedicated new development (£400 million) to make port one stop shop for North Sea wind energy including construction, assembly, installation and maintenance; Development includes 327 hectare Marine Energy Park with 52 hectares of quay hinterland and 1,567m of quayside. Special industrial quay 160m with 50t/m2 heavy lift re-enforced patches and 11m depth CD: Cater for specialized vessels and jack-up rigs; Port will be operational and maintenance centre for Humber Gateway Windfarm (220 MW) and future offshore windfarms planned for Dogger Bank, Hornsea and Norfolk Bank areas where up to 5000 turbines will be required. Jobs 10,000 by 2015.
Port of Cuxhaven North Sea	Seaport on deep water at mouth of River Elbe comprising 231 hectares of land and 88 hectares of water; Multipurpose port for shipping and transfer of cargoes; Ro-Ro, commercial vehicles, frozen fish and bulk goods; Deep water berths and water depths of up to 15.8 m; Port terminals have quay lengths of 840m and 250m with large areas of quayside space (260,00m2); mobile cranes (100t) and gantry cranes (up to 500t) with heavy lift operations; Over 10,00m2 of warehouse capacity; Port has developed special infrastructure including very strong re-enforced quaysides (90t/m2) to serve as an offshore base for assembly of components and construction and services for windfarms in the North Sea; New terminal to be constructed in 2013 with additional berthage quay 290m and adjacent land area 85,000m2 for handling and storage of cargoes.	Leading location for production, assembly and logistic services for offshore wind turbines in North Sea; Cluster for offshore wind power and maritime industries; Efficient infrastructure and heavy loading equipment with deep water berths; Can handle large jack-up barges and vessels; Special purpose concrete ring foundations for loading entire offshore units; Key position for a large number of supply chains and short access to North sea and Baltic Sea windfarms; excellent road, rail and shipping links to Europe.; A number of key offshore companies established including AMBAU (production of tower segments) and CSC Ltd (production of 500t BARD foundation tripods); Cuxhaven plans to expand its resources and facilities over next few years to take advantage of expansion of electricity production over 25,000MW from German offshore wind farms alone by 2030.

PART V

Conclusions

The way forward

The development of offshore renewable energy is one of the key emerging sectors in the marine industry, with major investments announced by the UK for the North Sea and Irish Sea. As we move into an era of reducing peak oil volumes and fossil fuels combined with a continued increase in global demand for energy, it is inevitable that the drive to create and deliver new alternate energy sources will accelerate. Already thousands of new jobs have been created in the UK to support the growth of offshore renewable energy services.

Ireland has set ambitious plans in the area of offshore renewable energy development but so far has not had the same level of success compared with the UK. In this concluding section we look at some of the issues which we identified through our research and informed feedback received from the various stakeholders. Our report points out that several Irish ports have been proactive in marketing and making direct contact with developers, including site visits and preliminary discussions on possible joint ventures or lease arrangements of facilities. However, we are aware that Ireland has been overlooked for at least two potential major inward investments in the manufacturing of offshore wind turbines.

To recap on the core aspect of the IPORES report, our market appraisal suggests that opportunities currently do exist for several Irish ports and harbours to be involved in various stages of operations, logistics and maintenance of offshore wind farms. This is especially the case for locations along the east coast of Ireland and in the north and central Irish Sea, including existing and planned sites off the coast of Wales and England. However, it is likely that full- scale developments such as the fabrication, construction and assembly phases including foundations will be limited to a few of the largest category A Irish ports. Some recommendations are put forward as a result of the survey and subsequent analysis that may assist a future national strategy and policy with regard to ports and the offshore renewable energy sector.

In the overview of the infrastructure and facilities of key ports in the Republic of Ireland (Table 2) and Northern Ireland (Table 3), the ports are graded into three categories:

- **Category A:** Ports which offer best potential as national or regional hubs for construction, fabrication and assembly of turbines and devices.
- **Category B:** Ports that have some potential to serve as operational and maintenance base for windfarms and wave energy/ tidal devices.
- **Category C:** Ports with limited potential as servicing and supply bases to the offshore renewable energy sector.

As we pointed out earlier, port categorisations should be used only as guidelines of suitability rather than firm recommendations for priority designations. It should also be noted that the commercial development and deployment of tidal turbines devices and arrays will take another 5 years whereas wave energy converters are not expected to be ready for commercial application for another 8-10 years. Ports therefore need to be re-evaluated at a later stage in relation to the scale of developments and technologies associated with meeting the specialised requirements of these marine renewable energy industries. In the final analysis, the selection of ports by developers will depend not only on depth of water, length of quayside and availability of large areas of landbanks, but also on a variety of other factors including location, financial incentives, consent arrangements, specialised support services and the estimated time frames needed to develop the facility to meet the commercial and environmental requirements. The proximity of other companies and centres of expertise to ports would also be an important factor in selection. For example, the distribution of some of the top 50 multi-national transport, construction, energy and pharmaceutical companies in Ireland are clustered within 10-20km of Dublin Port and the Port of Cork (Figure 17).

It is likely that selected Irish ports may need to upgrade their facilities and infrastructure within strictly required timeframes if they are to meet the needs of the offshore renewable energy developers. However as the benefits from such a large scale investment would flow to the local region and hinterland and not just the port, there is an argument that other stakeholders such as regional development authorities or local city councils could be encouraged to support some of this possible investment.

Communication and Information Sharing

Many of the ports have websites which outline details on their operations, facilities, infrastructure and activities. Only a few ports, notably Port of Cork, Cork Dockyard, Shannon-Foynes, Rosslare Europort, Belfast and Killybegs, had a marketing strategy in relation to offshore renewable energy which was clearly highlighted as a potential area for growth and business opportunities on their websites or brochures. (Some ports and harbour centres such as Ros an Mhíl, Castletownbere, Arklow and Greenore did not have a website but were in the process of developing one).

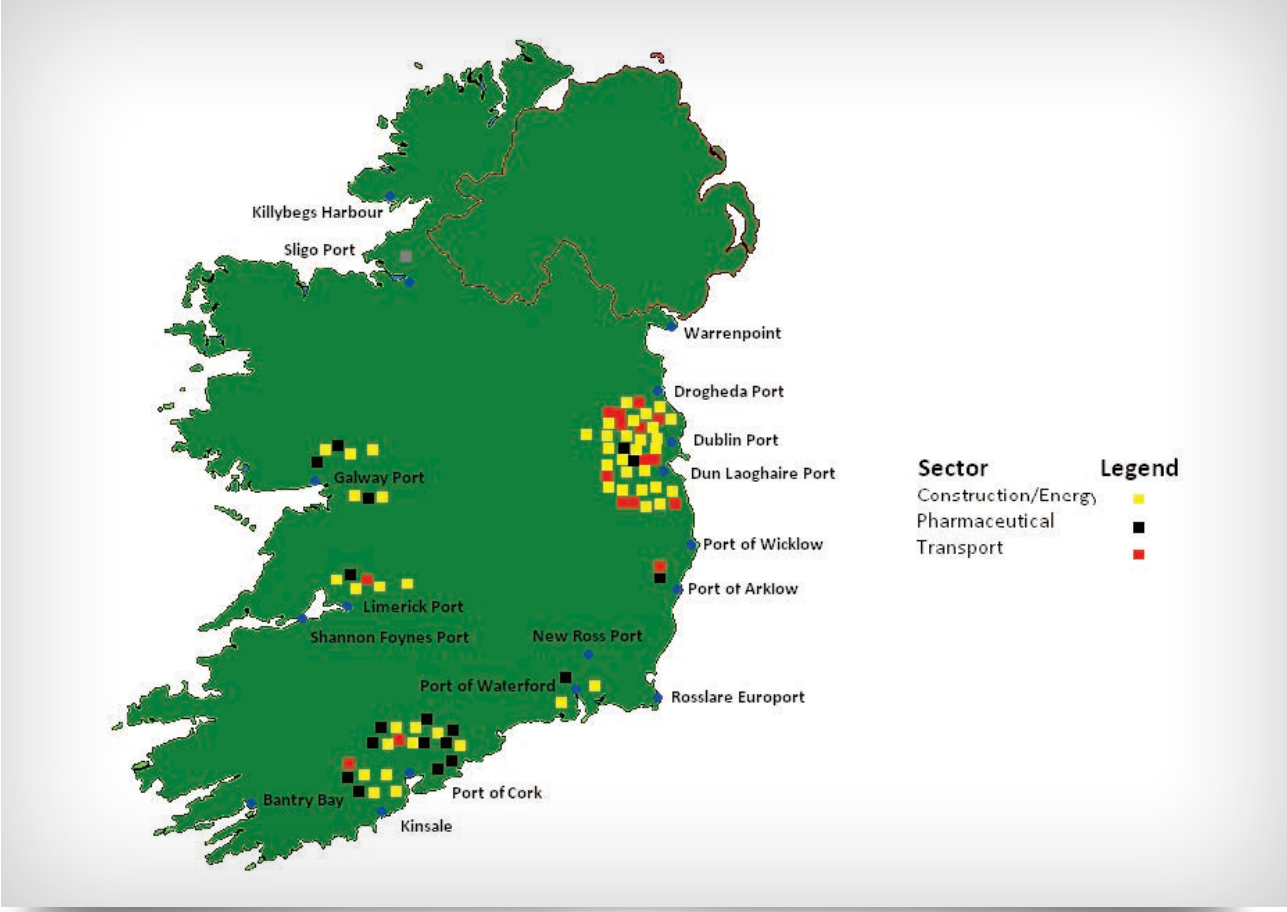


FIGURE 17 DISTRIBUTION OF TOP 50 MULTINATIONAL TRANSPORT, CONSTRUCTION, ENERGY AND PHARMACEUTICAL COMPANIES IN IRELAND IN RELATION TO LOCATIONS OF PORTS.

There was general consensus amongst the ports that there was the need for a dedicated national website that would integrate the relevant information and highlight what Irish ports have to offer developers in terms of infrastructure and facilities to support construction and fabrication; operation, maintenance and servicing; and research and development. We believe this is something that would be relatively inexpensive for the Government to create and could be used as a central marketing and information platform by Government agencies and departments in clearly communicating where our national strategic competitive advantages lie relative to the market opportunity. This would also help address perceptions which exist amongst the majority of stakeholders which indicate that there is very little communication and information sharing between ports in relation to offshore renewable energy developments or opportunities.

There was a positive response from ports to engage or work with other ports, including neighbouring ports if it was mutually beneficially to secure private or foreign direct investment. However at present, there is no obvious integration of potential supply chain companies or existing relevant multi-nationals around ports into clusters, along with an absence of coordination mechanisms for communicating between manufactures, shipping companies, the ports and service providers.

Co-ordinated Policy Support

There was also a common consensus amongst the port stakeholders on the absence of any clear policy framework at a national level for the development of an ocean energy industry with the necessary political will to invest in the business. However many of our meetings were undertaken before the Government integrated marine plan, "Harnessing Our Ocean Wealth", was published in August. This report identifies the potential of the offshore ocean energy sector and reveals an action plan for implementation of a number of high level strategic targets. We feel that many issues captured in this report will require a co-ordinated approach to solving and maximising the associated opportunities and, as such, believe it should be considered by the Governments' co-ordinated groups to determine appropriate targets to resolve some of the common issues.

While the port stakeholders generally felt that there was an absence of a coordinated approach between government agencies, offshore renewable energy developers and port authorities at national level, many demonstrated a willingness to engage with the government and its agencies in order to pursue more focused strategic planning in relation to the sector.

Government supported initiatives to bring offshore developers, turbine and foundation manufactures, offshore contractors, port owners and potential investors together, should be considered as a priority, if Ireland is to develop its offshore renewable energy resources. It was also emphasised by the port authorities that they are prepared to play their role in realising opportunities offered by the sector in terms of supporting job creation, advancing marine technology developments, the promotion of innovation and the integration of smart ocean clusters of small and medium sized enterprises.

There was a general acceptance that given the current fiscal environment, the Government would not be in a position to fund large scale infrastructure projects that might be used as a stimulus for foreign direct investment. However there were still roles identified for other support agencies involved with training and re-skilling which could be harnessed to develop the local workforce specific to the needs of the turbine manufacturing sector. It is likely that many of the skills required for the construction, deployment, installation and maintenance of the large turbines are available in many of the Category A and B port areas, in particular former construction workers, welders, ship builders and fishermen. Other areas that offer high added value are graduates with R&D capability in the marine sphere. Such co-ordinated financial stimulus packages have been applied successfully by the UK and German governments in attracting investors to kick-start the developments at key ports to meet requirements of the offshore wind energy industry i.e. Belfast / Harland & Wolff, Able Humber Port, and Cuxhaven. There would seem to be a strong positive cost benefit to introducing such incentives, given that long term tax contribution and spending in a region would outweigh social contributions or unemployment costs.

Port Development Barriers

The main infrastructural constraints facing many of the ports in relation to the offshore renewable energy sector are length of quay space available and insufficient hinterland for lay-down and storage of turbine towers, blades, foundations and ancillary equipment. Depth is a limiting factor in some ports both in the approach channels and at quayside berths where > 8.0m CD are required for large jack-up barges.

The granting of planning permission and foreshore licensing for harbour developments and infrastructure is seen as perhaps the single largest major obstacle in meeting clients demands given the long-lead in times required. A co-ordinated approach to address environmental and habitat issue is needed from Government if ports are to develop facilities within the required timeframes of developers.

Some ports are located several kilometres inland from the open sea, which could be a limiting factor in relation to access and future development. A lack of investment resources is a major constraint for development with regard to several of the smaller regional Category B and C ports, although a wider approach from within other regional entities to contribute to this investment should be considered. The larger Category A ports of Dublin, Cork, Belfast and Shannon Foynes are likely to have some investment capital of their own as a result of their business operations. However, the probability is that any potential investment in superstructure or facilities would in fact come from the private sector and the investment from the ports would likely be of a more remedial level. The ports would of course be naturally expected to maintain other infrastructure such as sea and road access.

Removing barriers to development

The vast majority of the investment is likely to be driven by the private sector in the area of offshore renewable energy. However the Government and its various state bodies as have a major role to play in removing barriers to growth. A structured approach to supporting what is considered by in large a highly realistic opportunity will lead to new investment, job growth and economic recovery. In order to achieve this, a more coherent approach in needed to address the primary barriers at a policy level. At the same time, a co-ordinated approach is required from the various state stakeholders in agreeing clear targets where potential development should be focused and which will also contribute to the actual attainment of investment. As we have broadly identified, this market segment has the potential to create several thousand new jobs, in the medium to long term. However, unless we can target how to deliver the first 100 jobs, then it is likely that Ireland inc. will miss out on a real opportunity.

Recommendations

1. Our report has designated at least 3 ports which we feel meet the minimum criteria to achieve Category A status for the offshore renewable energy services. We recommend that such a policy should be endorsed by the various state agencies and stakeholders.

2. We recommend that clear targets are established to deliver new offshore renewable energy projects at Irish ports. We recommend that a high level Government group oversee a coordinated approach between government agencies, offshore renewable energy developers, port authorities shipping companies and the services sector to provide more effectively deliver and manage an integrated national strategy.

3. We recommend that a national website should be developed as part of any future wider marketing strategy for the IPORES that would integrate information and data on Irish ports in terms of what they have to offer the offshore renewable energy sector.

4. A more detailed analysis of the jobs created and employment opportunities offered by the offshore renewable energy industry in the UK both at specific ports and through the supply chain would be very useful in terms of future planning for the development of the sector in Ireland. The inclusion of state training bodies or 3rd level institutions should also be considered.

5. A further assessment of the initiatives introduces by Governments in competing European locations for offshore renewable energy developments should be undertaken

6. Financial support and co-operation by other regional or state agencies should be considered by the Government to enhance the attractiveness of specific Irish ports to potential foreign investors.

7. The foreshore licensing and consent mechanisms needed for upgrading port development, including quay extensions and land reclamation in relation to facilitation of the offshore renewable energy development should be streamlined and fast-tracked to address environmental issues to ensure timeframes are met with regard to business development targets.

8. On-going evaluation of the suitability of Irish ports in the light of new technological developments in relation to wind, wave and tidal power, should be made to ensure capacity can meet the requirements of the industry. This would be particularly relevant in relation to the commercialisation, deployment and servicing of wave energy converters; the up-scaling of offshore wind turbines; and the development of offshore floating wind farms for extreme environments.

Annex 1: Schedule of visits to Irish Ports and meetings held with Port Authorities

Port Company	Date	Time	Person
Ros and Mhíl Fishery Harbour Centre	Wednesday 18th January	10h00	John Donnelly (Harbour Master) E-mail: johnc.donnelly@agriculture.gov.ie Tel: 091 572 108/087 235 9735 Gerry: 087 839 7714
Shannon Foynes Port Company	Thursday 19th January	11h00	Martin Morrissey E-mail: mmorrissey@sfpc.ie Tel: 069 73100
Galway Harbour Company	Monday 23rd January	12h00	Brian Sheridan (Harbour Master) E-mail: brian@galwayharbour.com Tel: 091 561 874
Killybegs Harbour Centre	Tuesday 24th January	11h00	Martin Connell (Harbour Master) E-mail: martins.connell@agriculture.gov.ie Tel: 074 973 1032/087 798 9730 Jim Parkinson E-mail: jim@sinbadmarine.com Tel: 086 257 7444
Greenore Port Ltd	Tuesday 28th February	12h00	Gerry Mc Garrity (Deputy Harbour Master of Greenore Port) E-mail: gerry@greenore.net Tel:042-9373666
Drogheda Port Company **Bremore Ireland – Port**	Thursday 1st March	10h00	Martin Donnelly (Cpt) E-mail: martindonnelly@droghedaport.ie Tel: 086 254 7827 Paul Fleming (CEO) E-mail: paulfleming@droghedaport.ie
Rosslare Europort	Tuesday 13th March	12h00	John Lynch (General Manager) Tel: 087 283 5112 Aedan Jameson (Harbour Master) E-mail: Aedan.Jameson@irishrail.ie Tel: 053 915 7920
Arklow Port	Wednesday 14th March	10h00	James Heaney (Harbour Master E-mail: arklowharbour@eircom.net Tel: 0402 32466
Port of Waterford	Wednesday 21st March	12h00	Darren Doyle (Harbour Master) E-mail: dd@portofwaterford.com Tel:087 222 4961 J.S. McIlvenny (CEO) E-mail: jsm@portofwaterford.com Tel: 051 874907

Port Company	Date	Time	Person
Port of Cork	Friday 24th February	10h00	Pat Farnan (Harbour Master) E-mail: pfarnan@portofcork.ie Tel: 086 259 2719 Michael Mc Carthy (Commercial Manager) E-mail: mmcarthy@portofcork.ie Tel: 021 427 3125
Castletownbere Fishery Harbour	Friday 24th February	15h00	Cormac McGinley (Harbour Master) E-mail: Cormac.mcginley@agriculture.gov.ie Tel: 087 215 5432
Port of Larne	Thursday 5th April	14h00	Trevor Wright (Harbour Master) E-mail: twright@portoflarne.co.uk Tel: 00 44 282 887 2100
WarrenPoint Harbour Authority	Tuesday 3rd April	08h00	Ciaran Cunningham (Deputy Harbour Master) E-mail: ccunningham@warrenpointharbour.co.uk Ian Taylor (Operations Manager) E-mail: itaylor@warrenpointharbour.co.uk Tel: 00 44 284 175 2828
Londonderry Port and Harbour Commissioners	Friday 6th April	10h00	Bill McCann (Harbour Master) E-mail: Bill.MCann@Londonderryport.com Tel: (0) 7801 032387 E-mail: Info@londonderryport.com Tel: 00 44 287 186 0555
Belfast Harbour	Tuesday 3rd April	15h30	Kevin Allen (Harbour Master) E-mail: k.allen@belfast-harbour.co.uk Joe O'Neill (Commercial Manager) E-mail: j.oneill@belfast-harbour.co.uk Tel: +44 289 055 4422
Dublin Port	Wednesday 19th April	14h00	Seamus McLoughlin (Operations Manager) E-mail: smcloughlin@dublinport,ie Tel: 01 887 6000
Burke Shipping Group	Wednesday 19th April	15h00	Pat Brennan (Commercial Director) E-mail: pbrennan@burkeshipping.com Tel: 086 811 0787

MARITIMEIRELAND

www.imdo.ie

Irish Maritime Development Office