



Blue Growth

Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts

Annex 5 Cluster reports

Call for tenders No. MARE/2010/01

Client: European Commission, DG MARE

Rotterdam/Brussels, 13th August 2012



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About the Consortium



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- Consulting: our consulting activity is covering all the fisheries and fishing activities, from the stock evaluation and catches to the marketing via processing, including Monitoring-Control-Surveillance and fishing port management;
- Technical assistance: Oceanic Développement manages scientific observers programs, catches control programs, MCS training programs;
- Expertise and know-how of the company are focused on fisheries sector only.

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1 Port of Oostende

1.1 Summary and highlights

- 1) The port of Oostende has shown several cycles of growth and regression over the past decades. At the end of the 90s, initiatives were started to revitalize the port area. Since then the port of Oostende has successfully focused on renewable energy. At the same time, since 2008, the more traditional maritime functions (maritime transport, passenger transport) are declining. The port of Oostende suffers from the economic crisis.
- 2) The newly emerging functions (most prominently offshore wind energy but also tidal current energy and blue biotech) are promising for the future, but mostly still small in size.
- 3) There are indications that the largest maritime function in Oostende is coastal tourism. Unfortunately this function seems hardly to be interconnected with the other maritime functions.
- 4) A number of synergies have been identified, of various types:
 - directly between two maritime activities: offshore wind and wave / tidal current energy sharing platforms and know-how , coastal tourism and coastal protection served by broadened beaches or even islands , offshore wind and fisheries sharing platforms;
 - via improvements by the national or Flemish government or by port authorities of shared framework conditions: e.g. road infrastructure. high-load quays which can be used by several sectors;
 - via shared research and development efforts;
 - from land-based to sea-based technologies and skills, e.g. the application of geotextiles in the offshore industry;
 - within a maritime activity, by building sufficient critical mass of suppliers, producers and distributors in a given local and regional setting. This in turn stimulates developments and helps to extend the value chain;
 - from scale to scale: from offering functionalities at municipal or regional level to upscaling to provincial, national, EU and even global level. An example are the data services provided by Vliz, the Flanders Marine Institute;
 - a special case of scale to scale synergy is the co-operation between regional ports as investigated in the Interreg/PATCH project (stimulating co-operation between 9 regional ports) and the Zeebroos initiative (promoting the co-operation between the ports of Zeebrugge and Oostende);
 - a major challenge is to fully exploit the potential synergies between existing port-related SME's and the new, large, internationally operating enterprises involved in renewable energy.
- 5) The main tensions that have been identified are:
 - spatial tensions on the sea, due to the limited size of Belgium's EEZ
 - spatial tensions on land, as a result of competition for space between the various port-related economic functions
- 6) Issues regarding the framework conditions:
 - An important issue in Oostende is the (future) demand for a skilled labour force, required for the construction, operation and maintenance of offshore wind farms. Directly related to this issue is the perceived mismatch between required skills and skills offered by existing SME's. As it is, the problem is solved by 'importing' the required labour force.

- A second important issue is the availability of funding. Oostende, as small port, finds it difficult to get EIB funding, while national funding schemes are slow, forcing the port into solutions like PPP.
 - A third issue is the difficulties the port of Oostende has in meeting EU environmental regulations, which are often not tailor-made to the capabilities and bearing capacity of small ports.
- 7) Lessons to be learned - what is transferable from the port of Oostende to the rest of Europe
- establish co-ordinating and networking institutes to promote synergies between stakeholders
 - develop the role of a neutral facilitator, bringing people together in an informal setting
 - of key importance seems to be, to strike a balance between diversification and specialization. Diversification in the port of Oostende involves among others promoting wind energy while fostering existing functions and skills. Specialization involves the timely identification and exploitation of strengths.

1.2 General description

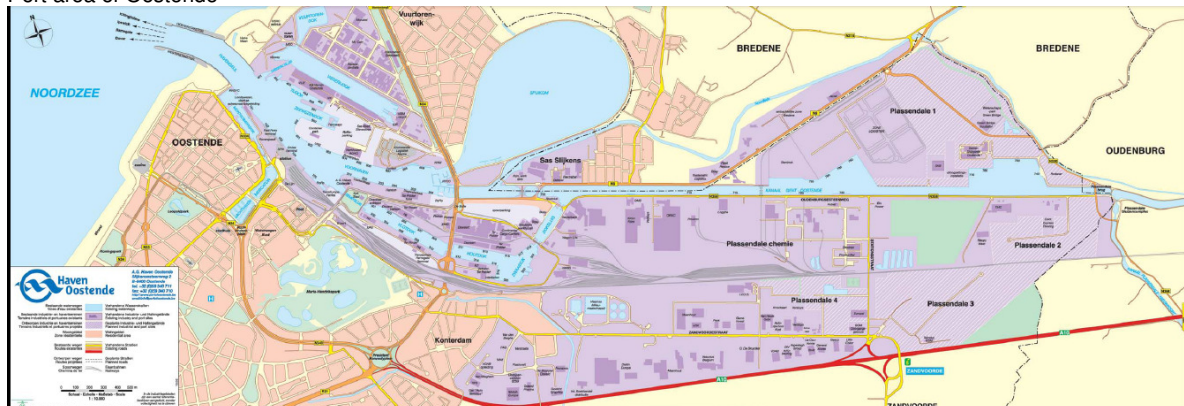
The Port of Oostende is situated on the Belgian North Sea coast, in Europe's busiest maritime area. It is a versatile shortsea port. It can accommodate all types of coastal maritime traffic. In addition to its seaport, Oostende is also home to an international freight and passenger airport. The multi modal function is further emphasized by the presence of comprehensive railroad infrastructure, of a canal leading up to the European inland waterway network and of the motorway A10-E40 linked directly to the port terminals.

The port has recently been modernised in both infrastructure and organisation and is now a leading force in the industrialisation of the hinterland. The industrial development in the inner port is subject to closer scrutiny and there is also focus on the development of renewable energy projects in the port.

The total Belgian coastline is only 67 km long. The coast consists primarily of sandy beaches. The whole coastal area is heavily urbanised; only at the borders with France and the Netherlands there are nature reserves.

Tides at Oostende rise about 5.1 m at springs and 4.2 m at neaps. Tidal currents are predominantly parallel to the coastline, reaching maximum speeds of ca 0.7 m/s in eastern direction and ca 0.5 m/s in western direction (<http://www.mumm.ac.be/EN/Management/Atlas/tidalcurrents.php>).

Port area of Oostende



source: www.portfoostende.be

View of the port of Oostende in westerly direction



source: www.portofoostende.be

1.3 Socio-economic characteristics

Population and employment

Oostende has some 70.000 inhabitants (2009), with over 250.000 people living in a radius of 30 km. Due to coastal tourism, this number increases to almost 300.000 people during summer.

The unemployment rate in Oostende is 9.5%, which is higher than Flanders' average of 6.5%. This has, to some extent, to do with people who work in the tourism industry during summer and are jobless during winter, although there is a tendency towards more evenly distributed employment. In the coastal tourism sector, nowadays the demand for employees cannot be fully covered by local employees. As a result, part of the seasonal work force is attracted from northern France (interview).

Hiring and firing personnel and minimum wages are strictly regulated, in a system that offers benefits to both employers and employees (Port Oostende, brochure 'Logistics in Oostende').

In 1997 a new autonomous port authority was set up. Since then 27 new companies were established in the area, creating 1500 jobs. The overall added value of the maritime cluster of the port of Oostende is estimated at 120 million euro in 2010 (Allaert, 2012). The maritime cluster is made up of goods handling, shipping agents, carriers, shipbuilding and maintenance, dredging and harbour construction, fisheries, maritime trade, the port authority itself and the public sector.

Main maritime economic functions

Short sea shipping

Oostende is not a transshipment port, nor a deep-sea container port. It is a typical distribution port, all goods are for intra-European distribution.

Oostende serves primarily as a gateway to the UK. Departures are offered to Ramsgate, Thames Gateway, Ipswich and Killingholme.

Port handling increased from 3 million tons in 1999 to 8.5 million tons in 2008 (Port Oostende, Allaert 2012), but since then has declined to 3.8 million tons in 2011. Similar trends are visible in RoRo, numbers of passengers and number of containers - container transport has stopped altogether in Oostende since 2008. See table 1.

The general cargo port is an essential and stable element in the port activities (see 'other freight' in Table 1). Seadredged aggregates are important import products as well as other products such as ferro silicium, building materials, timber and fertilisers.

The port of Oostende has been in the passenger business for over 150 years since the establishment of the very first regular service between the UK and the continent in 1846. There is no dedicated passenger service nowadays, but Transeuropa Ferries combines passenger and freight service on its line to Ramsgate.

Table 1. Some data for short sea shipping in Oostende, 2002-2011 (after G. Allaert, 2012). NB: the passenger figures include those for cruise shipping, which amount to between 2000 and 4000 / year.

		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
RoRo	tons/y	4,5	5,6	5,9	6,2	6,2	6,5	6,8	3,9	3,4	2,2
other freight	tons/y	1,6	1,6	1,6	1,5	1,7	1,5	1,7	1,4	1,5	1,6
total transport	tons/y	6,1	7,2	7,5	7,7	7,8	8,0	8,5	5,3	4,9	3,8
passengers	*1000	390	146	164	215	230	248	230	177	189	113
cars	*1000	51	-	3	12	28	29	28	22	29	14
lorries	*1000	228	285	301	300	297	301	300	159	128	88
containers	20TEU	9.156	13.263	15.418	9.036	4.555	3.281	0	0	0	0
ship movements	-	?	?	?	4843	4657	4759	4868	2952	2554	2204

Ship repair and maintenance

The former shipbuilding industry in Oostende has vanished. What is left is ship repair and maintenance.

Cruise tourism

The port and city of Oostende welcomes cruise ship visits and has the infrastructure to support day calls and turnaround business. The cruise-ships quays are adjacent to the railway station. A swing-circle of 300 m is present in front of the quay. The quay was strengthened and improved in 2000 and has a length of 250 m and a water-depth of 8.5 m at all states of the tide. The quay is situated in the outer-port, 500 m from the open sea and the relevant shipping-lanes, and next to the city centre of Oostende, so that cruise ships berth in the middle of the City.

The port and the city of Oostende offer all the right ingredients for a successful cost effective turnaround call for visiting cruise ships: Firstly, there is an easy access to the berths at all states of the tide, no locks, no sailing on narrow inland canals.

The number of calls declined sharply from 2009 to 2010, from 13 calls / 3814 passengers in 2009 to 6 calls / 1740 passengers in 2010. For 2011 and 2012 these numbers were expected to increase again (<http://www.cruiseurope.com/node/2996>, accessed 8 May 2012). Overall, Oostende is a small port with respect to cruise shipping, but it does have growth potential, due to the close distance from port to city centre, the short distance to major destinations Bruges and Gent, and the presence of the airport.

Offshore wind energy

The port of Oostende is making a considerable effort to facilitate investment in renewable energy, both for off-shore as well as for on-shore application. The port is making land and infrastructure available for construction, assembly, storage, distribution and maintenance of renewable energy projects on a.o. wind farm components. These efforts have been quite successful; the construction of windmills on the Thorntonbank in the North Sea has brought an entirely new industry to Oostende. Investments are made by several consortia, some of them based in Oostende, others in Zeebrugge, a.o. C-Power and Greenwind. The port of Oostende has invested in a new infrastructure on the East Banks of the port, which made it possible to construct and transport the windmills to sea. New projects are planned in the future. Total investments amount to 1.3 billion euro up to date, creating some 260 jobs (150 in construction and 100 a 120 in operation and maintenance), planned total investments amount to 10 billion euro until 2017/8. For the longer term, the port of Oostende aims at keeping an important role in the operation and maintenance. Yearly expenditures on operation and maintenance are estimated at 5% of invested value (interview), eventually leading to a yearly turnover in this sector of 500 million euro, and a permanent employment of 600 to 800 fte's, many of which high-skilled.

The project "Thorntonbank" of the company C-Power consists of the construction of: 60 turbines of 5MW on the Thorntonbank 28.7 km from the Belgian coast in water depths of 12 to 27.5 m. The first 6 windmills were constructed in this area in the period 2007-2008, and made operational in 2009. Another four project phases are due to follow by 2013. Phase 2 implies the construction of 24 windmills and another 24 windmills are foreseen in Phase 3.

Construction of windmills at C-Power

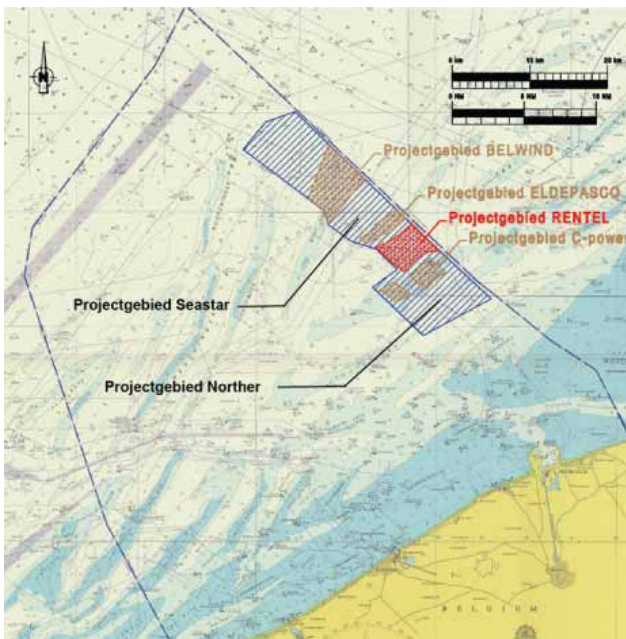


source: www.portoostende.be

The windmills are transported from the construction area to a specially constructed quay with a bearing capacity of 100kN/m^2 . From there on, the foundation is lifted by a work platform and then the entire platform with foundation is towed away with a tug to the exact location on the Thornton bank.



The wind farm will have an installed capacity of up to 300 megawatts and is expected to produce around 1,000 GigaWatt-hours of electricity per year. This volume is sufficient to meet the requirements of about 600,000 people. It is to be equipped with 60 turbines of the 5 megawatt class. The wind farm will meet a substantial part of the development targets of the Belgian government for renewable energies.



Other offshore renewable energy

Oostende also houses research and development facilities for wave and tidal energy. Amongst others DEME-Blue Energy is investing in renewable development in Oostende. Experimental set-ups for wave

and tidal energy conversion have been or are being installed. However, these activities are still in an early stage of development.

Onshore renewable energy projects

In Oostende the link is being made with other, land-based types of renewable energy. The whole renewable energy sector is supported by Greenbridge (see 1.6) - Innovation and Incubation Centre which focuses entirely on renewable energy. The port has attracted already quite a number of companies active in the renewable energy sector since a few years:

- Electrawinds: biofuel and biosteam
- Ecoflanders: agricultural waste project
- Green Power Solutions: 12 MW biowaste conversion facility
- Verhelst: photovoltaic cells, capacity 1.3 MW
- Proviron biodiesel 100,000 tons/year experimental facility to convert biomass to energy.

Coastline tourism and marinas

Oostende has 11 km of sandy beaches, which attract over 130.000 tourists during summer. For bad weather conditions a large variety of entertainment and cultural activities are in place.

Some data, for the whole Belgian coast (67 km), of which Oostende owns 11 km (source: interview mr. Geert Hoorens):

- annual turn-over ca €2.5 billion
- employment ca 37,500 fte
- ca 31 million overnight stays annually
- 86.000 second homes
- 18 million day visits

No specific data have yet been found for Oostende. A first approximation remains difficult: on the one hand, the comparably long coastline suggests that coastal tourism may be a larger than any other maritime economic activity in Oostende. On the other hand, however, the rather limited size of the sand beaches in Ostend may also put the city in a disadvantageous position compared to other Flemish coast destinations.

Some 20 years ago, the tourism sector was in decline. Investments were falling; the sector was active in July and August but the rest of the year many facilities were closed, the employees going abroad. This has changed: nowadays, less than 30 percent of the yearly turn-over is obtained in the summer months. The area has developed to a 'four-season destination', by organising off-season activities, indoor activities such as shopping facilities, museums, an aquarium, and by restoring historic sites and buildings. Some examples are Earth Explorer, Fort Napoleon, the Casino Kursaal, the Sea heroes square and the restored Venetian Galleries. By making these investments the negative trend has been stopped and the port of Oostende can now face the competition with other destinations, such as offered by low-cost carriers.

The largest marina of Oostende, the marina mercator, consisting of two docks, is located in the heart of the city. Once the lock is passed, boats can reach the town hall and the shopping area of Oostende. 320 Berths are available and modern facilities are offered.

Fisheries

Fisheries in Oostende have declined over the past decades, from about 200 vessels in 1960 down to about 25 in 2010. In 1983, at the onset of the Common Fisheries Policy, there were 73 vessels in Oostende. After a period of transition in which vessels were decommissioned, capacity and fishing effort are now considered to have adjusted to the declining quota. Efforts are underway to phase out the environmentally destructive technique of bottom trawling, and to replace it by new techniques that are more energy-efficient (sum wing, electric pulse fishing). Also, alternative fishing techniques such as line fishing and gillnet fisheries, are being implemented with a varying degree of success. The traditional inshore or coastal (>12nm) fisheries for brown shrimp is also in decline. The fisheries and fish processing industry in Oostende are worth 45 million euro. The fish industry processes mostly imported frozen fish, as the supply of fresh catch is too irregular to base an industry on. Employment in this sector has decreased strongly.

Aquaculture research has more than 30 years of experience, focussed on disease control from the early hatchery up to juvenile and adult stadia and on quality control of food supply products. Most of the aquaculture is done abroad. There is little marine aquaculture activity in Belgium. Fish breeding is in an early stage. Research efforts and aquaculture activities have been deployed in all continents, and there are specific cooperation agreements with several Asian research institutes.

Algae growth and blue biotechnology

Developments in algae growth must be regarded in connection with the development of a bio-based economy, use of biomass for fuel and high-value products, both land- and sea-based. Co-operation between several Flemish government departments to develop a Flemish bio-economy strategy has started.

Another recent development is the FISCH project (Flanders strategic Initiative for Sustainable Chemistry), part of which focuses on bio-based chemistry, with a branch to the marine environment for algae, enzymes and metabolites.

An important related trend is the development of standardized products at cellular and organisms level, for research in (a.o.) pharmacy and food supplements. Here the EU plays a role, among others via the EMBRC (European Marine Biology Research Centre). The ESFRI (European Strategic Forum for Research Infrastructures) is under development. This is seen as a market with strong growth potential. Also for these networks strong growth is expected, which will have its effects for among others in Horizon 2020

1.4 Synergies and tensions

Synergies

Synergies between different maritime functions

Coastal protection aims at the protection against a 1/1000 years' storm event, by enforcing the coast with sand supplementation. Sand supplementation broadens the beach, offering perceived opportunities for entrepreneurs active on the beach, although this is challenged by other users.

Apart from the regular sand supplementations, there is a project (still only on paper) called 'Flemish bays' which is designed to protect the coast by extensive dredging and creation of islands in front of the coast. Such islands are eagerly welcomed by municipalities for the potential development of coastal

tourism that they offer. However, the problem is that flood safety can not be guaranteed on such islands, which makes investments risky and even undesirable.

The development of the port of Oostende as a wind energy hub may offer new job opportunities for employees from the declining traditional functions. However, Allaert (2012) points to the weak links, in terms of subcontracting and job creation, between the new enterprises and the SME's present in Oostende. According to other interviewees, the traditional sectors move slowly and do not respond to the demands that the wind energy sector poses (e.g. in terms of ISO certification, acquiring the necessary skills to operate the specialized vessels).

Synergies between tourism and fisheries vary according to the activity: Fishing vessels, albeit limited due to required permissions, are directly selling their catch to the public. Despite limited licenses available for fishermen, these so-called "vistraps", where fish products are directly sold to tourists, attract a considerable number of tourists to the harbour of Ostend. In particular, the one-day visitors and tourists residing in neighbouring coastal towns. Further synergies exist due to the fishtrips, occasionally organized in Ostend by vessel operators. Some less strong synergies are related to the fish auctions in Ostend, since it has limited value to the tourism sector: it is not open to the public, small in scale and most active in the early hours. Another potential synergy would be 'litter fishing' by fishers, but this idea meets with resistance from the sector.

Some synergies between coastal tourism and general port activities have been identified: the 'Oostende voor Anker (Oostende at anchor)' event, May 2012, where old steam boats were on parade, an event which attracted over 250.000 visitors; a general addition to the perceived value of the tourist destination, e.g. in walking the piers and watching ships. Here it is mostly the tourism sector gaining from the port facilities; the benefit for the port is primarily in image building.

Land-based & sea-based activities

There are many technologies that are developed on land that could also be used on sea. Examples are GPS, use of textiles, polymers. The reason that this is not happening yet may be unfamiliarity or the adaptations required for the harsh conditions at sea.

Electrawind started with planning offshore wind parks, is now also involved in renewable energy on land (solar, bio-steam facility).

There is strong synergy between land-based and sea-based biofuels and biotechnology. It is important to approach these sectors as one field of study.

A major private enterprise in the port area, though not directly sea-related, is Daikin (air-conditioning systems). This enterprise is broadening its scope from air-conditioning to the development of integrated sustainable cooling/heating systems, including related energy technologies such as heat-power cogeneration. This proposes a link with the R&D enterprises active in the port of Oostende in green and blue energy.

Creation of critical mass, research and application

This is at the core of the ongoing activities of e.g. VLIZ and FMC (see 1.6), and the development of the port area for renewable energy: to bring together small enterprises, and bring them physically close to research institutes, to help them bringing good ideas to actual market implementation.

Part of the harbour area is specifically dedicated to high-tech enterprises. A first lot is occupied by a centre for enterprises and testing facilities. Initiator is Greenbridge (see 1.6).

Spatial synergies

Combining wind farms with aquaculture or algae growing may offer synergy opportunities, but this is not without drawbacks. At this point in time, energy operators are quite reluctant to admit other users to their parks, for fear of accidents (collisions of vessels, cutting cables) that may endanger production. They require very firm insurance, which is very expensive, partly for lack of data on the risks involved. On a positive note the plans of DEME to combine wind energy with wave energy can be mentioned.

Sustainability issues

The port of Oostende has no dedicated policy in this field yet. The port of Antwerp has developed ecological footprints for the harbour as a whole and for the companies occupying the area, and favours companies and vessels with smaller footprints by imposing smaller fees. In due time the port of Oostende may follow this example.

The Belgian coast is highly urbanised. In that respect it differs strongly from the French and Dutch coasts. Issues of sustainability have been incorporated in policies, as a result of pressure from public opinion. Nature areas are only found at the borders with France and Germany, plus a small area near the port of Zeebrugge.

Framework conditions

Synergies also include such basic requirements as good connections (which have been taken care of now in Oostende, by construction of motorways, railroads and airport), adequate harbour facilities (new quays, sufficiently deep access lanes), an attractive environment to live in (investments in urban renovation), offer attractive conditions for new enterprises to settle in the area, etc.

According to one of the interviewees, improvement is needed in the knowledge infrastructure. At the moment the subcontracting and transfer of knowledge from newly arriving enterprises to existing, mostly small-scale SME's, is suboptimal. This introduces an element of vulnerability for Oostende, because if the new enterprises should leave, not much will be left behind in terms of jobs and skills.

Tensions

Spatial tensions at sea

Belgium has only 67 km of coastline, and by consequence the EEZ is small. In that area 7 wind parks are projected, and some of the busiest shipping lanes in the world must be accommodated as well. This leaves very little space. More space would be welcomed, e.g. for test facilities for energy and coastal protection by artificial islands.

Spatial tensions on land

As a result of the port of Oostende's choice for high tech, some room in the port was planned to be converted to enable the expansion of wind energy and to build attractive houses for new employees. This has led to tensions with companies now residing in that area, mostly SME's.

Coastal protection not only offers opportunities, but also tensions, because sand supplementation causes a lot of disturbances on the beach. MDK (responsible for coastal protection) advised against the

proposed installation of Wifi-transmitters on the beaches. There are ongoing discussions on who is entitled to use the extra beach area created by sand supplementations.

There are some tensions between nature protection and tourism, most notably at the nature reserve near Zeebrugge. Nature organisations want to protect that area, while the tourism sector promotes some way of shared and sustainable use.

Spatial tensions were expected from the construction of the wind parks, affecting the horizon. As a result the wind farms are constructed further from the coast, at the cost of increased production costs.

Further tensions arise between the local inhabitants and tourists, by way of the increased house prices, which make it difficult for local people to find affordable homes.

1.5 Main stakeholders

Important stakeholders are:

For the economic functions:

- Port of Oostende;
- Port of Zeebrugge as potential partner;
- Dredging/construction/offshore: Decloedt (based in Oostende), Jan de Nul and DEME, large internationally operating companies;
- Enterprises as C-Power and Electrawind, active in wind energy and offshore;
- Daikin industries as major employer in the port area;
- Various companies in the offshore value chain;
- Small-scale research and development companies in the fields of blue biotech, renewable energies;

Authorities:

- Federal and Flemish authorities
- Province West Flanders
- Municipality of Oostende, and 9 other coastal municipalities
- MDK (Maritime Service for the Coast) for Coastal Protection)
- Coordination Centre for Integrated Coastal Zone Management
- network organisations Flanders Marine Institute (Vliz) and Flanders Maritime Cluster (FMC).

Research and development:

- Universities of Gent, Leuven and Antwerp;
- European Science Foundation (ESF)
- The Institute for Agricultural and Fisheries Research (ILVO), a Flemish Scientific Institute.

The importance of the EU as a stakeholder, in many ways, from various policy and regulatory fields to financing mechanisms to establishment of networks, is emphasised on several occasions.

1.6 Governance and integrated policy responses

It is important to recognise the specific governmental arrangements in Belgium between the levels of the Federal State and the Flemish Region, which have their impact on sea-related management. Because the levels of the Federal State, the Flemish Region, province and municipality all have their

specific roles and responsibilities in the coastal area, organising decision making on coast-related matters is sometimes complicated.

Policy responses that have been implemented to develop synergies described in 1.3

At EU level a number of initiatives have been implemented to develop synergies described:

- several JPI's, focusing on research in the oceans;
- the initiative mentioned in par. 1.3 for standardized products for research via the EMBRC.

Institutional arrangements that have been implemented in Flanders:

Foundation of the Flanders Marine Institute (VLIZ).

The VLIZ, the Flanders Marine Institute, was founded in 1999. It started off as an initiative by the Department of EWI (so, in that respect, top-down) to establish a platform of services (logistics, data) for the research community. It turned out to be very successful and has gradually extended to European and even global level activities, housing the secretariat of the Marine Board, and facilitating the coordination activities for data and standards for UNESCO-IOC (International Oceanographic Commission)-IODE (International Oceanographic Data & Information Exchange).

The VLIZ is the coordination and information platform for marine scientific research in Flanders. It is a focal point for marine and coastal-related research and serves as an international contact point. The VLIZ signs cooperation agreements with Flemish research groups and administrations and furthermore integrates its activities in national and international networks. Major activities are the management of the Flanders Marine Data and Information Centre (VMDC), the Info desk, the Sea Library and the research vessel 'Zeeleeuw'.

The VLIZ is an autonomous institute with the legal status of a non-profit organisation and has the following strategic objectives:

- Promoting Flemish marine scientific research.
- Serving as an international contact point in the marine scientific field.
- Promoting the international impact of Flemish marine scientific research.
- Promoting the visibility of Flemish marine scientific research to the public at large by means of popularisation and sensitisation.
- Providing scientific information on the sea to policy makers, whether or not upon request, so that they can use this information to develop their policy with regard to marine affairs.

Foundation of the Flanders Maritime Cluster (<http://www.flanders-maritime-cluster.be/en>)

The Flanders Maritime Cluster (FMC) was founded in 2010, as a result of several impulses. One of those was the Katrina storm, which made Belgian dredging companies (Jan de Nul, DEME), realise that they needed to combine their marketing expertise and efforts to win big contracts. A second impulse was the challenge posed by the declining shipbuilding and fisheries sectors; how to keep people at work, how to keep promising niche activities alive. A third impulse was the wish to introduce new technologies, such as wind energy, offshore, communication technologies. Thereby the idea was to overcome the barriers between land-based and sea-based activities, partly due to unawareness, partly to the harsher conditions at sea which make adaptations necessary before introduction.

Flanders' Maritime Cluster aspires to offer the following services to its members by providing first line advice and act as a referral function.

- Actively promote the competences of the marine and maritime sector

- Stimulating partnerships
- Stimulating knowledge
- Support for the commercialization of the marine and maritime technology

The Coordination Centre for Integrated Coastal Zone Management in Belgium is a point of contact in the coastal zone where cross-sectoral themes are discussed. Its mission is to stimulate the sustainable management of the Belgian coastal zone. The three strategic goals are to co-operate in the implementation of integrated coastal zone management, to promote the integration of planning and policy in the coastal area, and to create support for integrated coastal zone management.

Greenbridge is the West Flemish science Park of Ghent University, located in the outer port of Oostende. It houses the Greenbridge incubator, incorporated by Ghent University, POM West-Vlaanderen, Catholic University College of Bruges-Ostend and AG Port of Oostende (prior NV Plassendale). Later on, ADMB (2007) and Howest (2010) became shareholder of Greenbridge N.V. Greenbridge tries to create an innovative and entrepreneurial climate in the Oostende region. In the incubator facilities, Greenbridge supports specifically high-tech start-ups and spin-offs in the development of their enterprise. The rest of the science park is open for more experienced enterprises in promising technology domains.

Other initiatives taken to develop synergies described in 1.3

The informal meetings organised by FMC (see e.g. website FMC) are useful in developing synergies described above.

Cooperation initiatives with other regional ports

PATCH (Ports Adapting To CHange; www.portofoostende.be/patch) is an Interreg IV A 2 seas program, in which a partnership is formed between 9 regional ports in the southern North Sea and Channel area, lead by Oostende. Internally, ports need to focus on high added value operations, fast track investments, by modernizing the infrastructure. Externally, ports overall competitiveness must be increased to be attractive for all users. Therefore, PATCH focuses on the improvement of the quality of the management of the ports, the enhancing of the diversification of economic activities in ports and the improvement of the quality of the logistic operations on both landside and seaside. The project will end in 2012.

Zeebroos is a bilateral initiative towards closer cooperation between the ports of Zeebrugge and Oostende. So far this has resulted in the successful fusion of fish auction. Other areas, such as cruise shipping, offer promising perspectives, but progress is slow.

1.7 Literature

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1.8 List of interviewees

Name	Institution	Role
Jan Dekock	Flanders Maritime Cluster, Oostende	Technology expert
Kathleen D'Hondt	Flemish Department of Economy, Science and Innovation (EWI), Brussels	Researcher
Rudy Herman	Flemish Department of Economy, Science and Innovation (EWI), Brussels	Researcher
Geert Hoorens	Westtoer, Oostende (tourism)	Regional manager, coastal region
Georges Allaert	Gent University, Gent,	professor dept. Mobility and Spatial Planning
Paul Gerard	Autonomous Port of Oostende	director
Wim Stubbe	Autonomous Port of Oostende	business development manager
Simon Pascoe	Autonomous Port of Oostende	PATCH coordinator

2 Gdańsk Bay

2.1 Summary and highlights

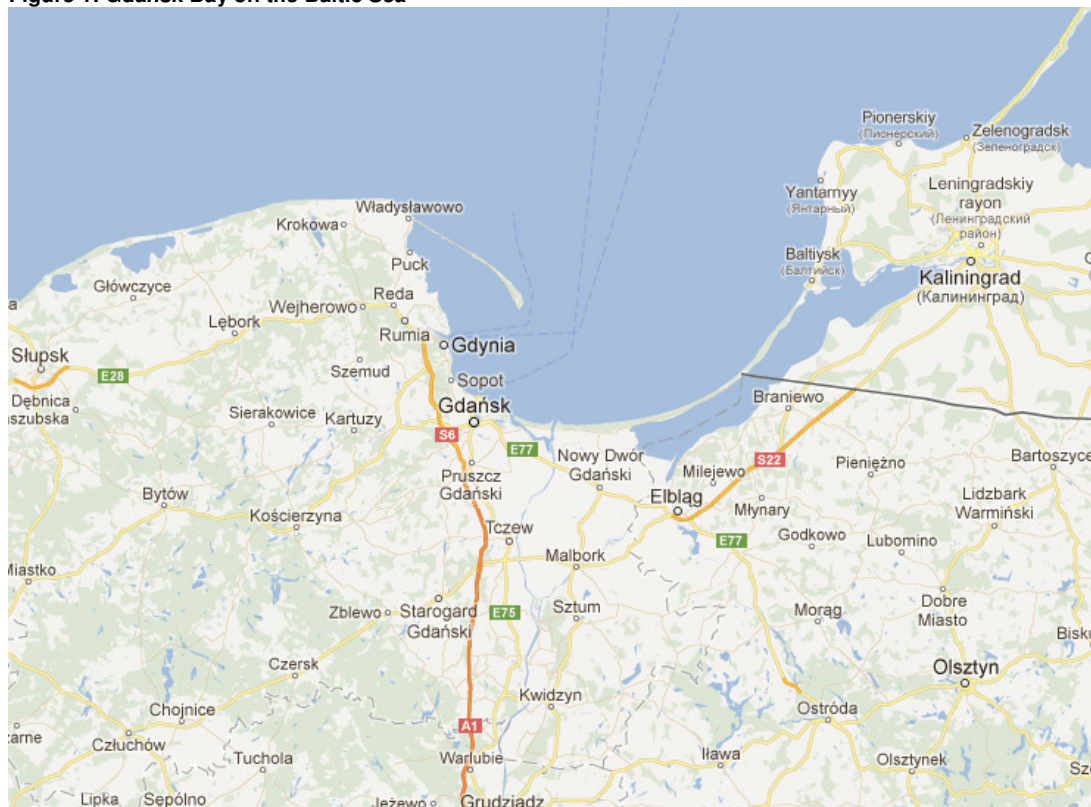
- 1) For many years Gdańsk served as a major transport and trade node in Poland. In the 1960s and 1970s the traditional maritime industries were supported by the government and shipyards played an important role in the area's economy. The opening of the market and decline in the world demand for ships led to the decline of this industry. Initially a challenge for the regional economy led to diversification of the production and services offered in the region in a longer term. Construction of small luxurious yachts, motor boats and tourism development became extremely important for the provinces Pomerania and Warmińsko-mazurskie. New sectors show potential for development such as renewable energy and building of wind energy constructions. They are expected to show strong growth in the future and provide inclusive jobs.
- 2) The main economic functions in the region are:
 - traditional maritime industry (shipbuilding shows decline, deep sea maritime transport and short sea shipping show growth, passenger ferry services show small decline)
 - energy and raw materials (onshore refinery of oil & gas is strong)
 - tourism (coastline tourism, yachting and marinas show growth)
 - coastal protection: protect habitats (increased importance and awareness)
- 3) The sub-functions that show strong growth potential are:
 - - offshore wind, ocean renewable energy
 - - leisure, working and living (coastline tourism, yachting and marinas)
- 4) Main synergies identified
 - - Regional Tri-city cooperation in various economic aspects between stakeholders
 - - active role of the Regional Government in the economic development
 - - offshore energy production and offshore industry development (diversification of the old shipyards)
- 5) Main tensions identified
 - - offshore wind, ocean renewable energy, spatial planning versus protection of environment and habitats
 - - potential capacity constraints in ports of Gdańsk (DCT) and Gdynia
 - - insufficient key personnel in logistics, lack of schools and logistics teaching programmes
 - - liquidation of part of the Naval Shipyard Gdynia
- 6) Policies addressed
 - - agreements on international inland waterways E-40 and E-70
 - - Pomeranian Group of Cluster Competence
 - - SoNorA (waterway Gdynia-Karlskrona, intermodal solutions in Gdynia)
- 7) Policies not yet addressed
 - - creation of a logistics competence centre
 - - efficient use of rail and inland waterway links mainly between Gdańsk and Warsaw,
 - - creation of a rail link between Gdańsk and the East - Kowno (Kaunas)
- 8) Lessons to be learned - what is transferable from Gdańsk to the rest of Europe
 - Important role of the regional government and its leaders

- Baltic Sea cooperation with other countries
- Diversification of industry and services

2.2 General description

Gdańsk Bay lies within the Baltic Sea mainly on the Polish territory. The Bay is separated by the Vistula Spit. The Western part of the Bay is formed by the shallow waters of the Bay of Puck. The south-eastern part is the Vistula Lagoon, connected to the open sea by the Strait of Baltiysk. The Pomerania region forms a large part of the Polish part of the bay (Cape Rozewie, Hel Peninsula). The Hel peninsula and the Vistula Spit are two very long sandspits that form the coast of the bay. The major ports and coastal cities on the Gdańsk Bay include Gdańsk, Gdynia, Puck, Sopot, Hel, Elbląg, Frombork and Krynica Morska. The bay is located in the mouth of the Vistula and its branches (the Leniwnka, the Śmiała Wisła, and the Martwa Wisła and indirectly via the Vistula Lagoon with two branches, the Nogat and the Szkarpa) and the Pregolya rivers.

Figure 1: Gdansk Bay on the Baltic Sea



maps.google.com retrieved June 6th 2012

In winter the bay is mainly free of ice but sometimes ice can be present in the Puck bay. The maximum depth in the Gdańsk Bay is 118 meters. The surface waters temperatures vary between 2° in winter and 18° in summer while the Bay's salinity is at the level of approximately 0.7%. In January the average temperatures are at the level of 0° to -5° C while in July the temperatures vary between 16 and 18° C¹. One of the key issues determining the climate of the Gdańsk Bay is the wind. Throughout the year most of the

¹ http://www.kzqw.gov.pl/files/file/Materialy_i_Informacje/Programy/Program_wodno_Srodowiskowy/Zalacznik_3_Projekt_PWS.pdf

winds are West winds while in the summer there is also a significant share of North East and East winds. The wind strength is the strongest in the winter season. A specific type of wind that affects the climate of the shores is breeze. There are two types of breeze, the sea breeze (daily breeze, the wind blows from the sea towards the shore) and the land breeze (night breeze, the wind blows from the land towards the sea).

The most important fauna species in the area include grey seal, porpoise, sturgeon, herring, sprat, salmon, sea trout, cod, turbot, and flounder. There are also a number of rare birds. The flora is also very rich and diverse. There are currently nine natural landscape parks in the Pomeranian Voivodship spread over 167 856,20 ha of land (excluding waters). In the region, they are all types of sea coasts characteristic for the southern Baltic Sea:

- cliffs, formed by the high bank erosion by waves (Chłapowski Cliff, Cliff Hill Jastrzebia);
- coastal dunes formed by the accumulation of activity waves and coastal currents (edge of the Hel Peninsula, Białogóra);
- low alluvial coasts (salt meadows);

The Vistula Lagoon is a natural landscape park and it is used mainly for tourism purposes. Due to the instability of land as well as natural fauna and flora species, it is industrialized only in the western part. The Eastern part of the lagoon lies within the Kaliningrad Oblast being the federal subject of Russia.

2.3 Socio-economic characteristics

Population & employment

From the Polish side the Gdańsk Bay borders with two Voivodships: Pomorskie and Warmińsko-mazurskie. The overall population of these regions is 2,332 million inhabitants (2010)². The unemployment rate in the Pomorskie Voivodship is at the level of 12.3% (2010) and it was exactly at the level of the national average. The unemployment rate in the Warmińsko-mazurskie Voivodship, however, is the highest in the country and it is at the level of 20%.

Economy

Pomorskie Voivodship

Gdańsk is the capital of this Voivodship, which produces 5.7 % of the Polish GDP. Industry provides 6 percent of the total value of industrial national output while the employment is 5.4 % of the total number of employees. Main industries include: wood and paper industry, shipbuilding, petrochemical industry and electrical industry. A characteristic feature of the strongest industries is the presence of large businesses, namely shipbuilding – Shipyards in Gdynia and Gdańsk, refinery – Lotos Group, Paper - International Paper Kwidzyn). Additionally, a number of large international companies have located their businesses in the region (Nestle, Rubbermaid, Schieder Europe, General Electric, Alte Leipziger Europa AG).

Warmińsko-mazurskie Voivodship

The Voivodship spreads over 24.2 thousand km² with the population of million 1.43 inhabitants. In 2011 it produced only 2.8 % of Polish GDP. The predominant industry is the production of machines for metalworking (46 per cent of domestic production – the first in the country). Additionally, as the region has an agricultural character, food processing is located there. The area is also known for its alcoholic beverage

² http://www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_rs_rocznik_demograficzny_2011.pdf

industry, production of rubber (tires) and furniture and joinery. In recent years, a number of large companies have located their business in the region (Michelin, Texel, Safilin, Philips, Heineken, Ikea, Campofrio and Provimi).

The overall employment in the Pomorskie and Warmińsko-mazurskie voivodships with the division per maritime sector (according the classification applied by the Polish Central Statistical Office) is presented in Table 1.

Table 1 Persons employed by sector in Poland, Pomorskie and Warmińsko-mazurskie voivodships in 2010 (As of 31 Dec)

Specification	Persons employed		Of which in voivodship	
	Total in Poland	Pomorskie	Warmińsko-mazurskie	
Cargo handling and storage in sea ports	7.487	2.664	5	
Other activities supporting sea transport	2.205	1.341		
Activity of maritime transport agencies	4.351	2.163		
Seaports authorities	910	599		
Maritime and coastal waterborne transport	2.347	1.363	15	
Construction and repair of ships and boats	28.542	16.675	1.105	
Sea fishing	3.071	1.654	113	
Fish and fishing products processing and preserving	18.844	5.861	217	
Retail and wholesale of fish, crustaceans and shellfish	6.092	1.011	174	
Research and development activity and maritime education	3.334	2.388		
Maritime offices	1.614			
Other activities	4.317	2.651	73	

Source: Central Statistical Office, Statistical yearbook of maritime economy, Warsaw, Szczecin, 2011

Main sea-related economic functions

Maritime transport

The transport infrastructure development in the region has been recently mainly focused on the road and airport development. In the last few years significant infrastructure projects aimed at enlarging the Gdańsk and Gdynia ports were implemented. There is potential for higher use of intermodal connections to transport goods from the ports to the hinterland. However, at present this potential is not being explored. The use of rail and inland waterway connections is very limited. The increased use of intermodal links should enable the ports to limit the road congestion as well as to limit the impact of the ports and transport of goods on the environment by the increased share of more environmentally friendly modes of transport. The following developments could be further explored:

- The link between the cities of Gdańsk (and Elbląg) and Warsaw, where both the rail and inland waterway links should be developed.
- A new link between Gdańsk and the East in order to transport goods further to Easter Europe - Rail Baltica in Kowno (Kaunas).

- Additionally, both Gdańsk and Gdynia ports show further potential for growth. It is important that they are not only well connected to the main economic centres in the country but they should also have enough capacity to handle, store, process goods within the ports. Further investments are needed in both Gdańsk and Gdynia in the development of logistics services, storage of goods, so called Red Road in Gdynia, dry port in Gdynia, further expansion of DCT in Gdańsk.
- Currently the rail links with the South of the country are used for transporting only limited amounts of goods. Instead of transporting various goods by trucks, larger shipments should be more often transported by rail.

Deep sea shipping

Deep sea shipping in Poland is mainly handled by the three largest Polish ports, namely Gdańsk, Szczecin and Gdynia. Gdańsk and Gdynia are located in the Gdańsk Bay and they both contribute to the regional and national economy. Deepwater Container Terminal Gdańsk became operational on 1 June 2007. Phase one of the terminal construction was completed in October 2007. In 2011 the terminal handled over 641 thou. TEUs. The terminal's targeted capacity rate will reach ca. 4 million TEUs. Additionally, one of the berths has been equipped with a Ro/Ro ramp. Handling is provided by means of state-of-the-art IT system supporting EDI. As of January 2010, in addition to feeder container services, the DCT also handles the AE10 regular deepsea service operated by Maersk Line. It is designed to accommodate the largest vessels that can enter the Baltic Sea i.e. Postpanamax vessels. The terminal is under further development.

Shipbuilding

Shipbuilding has long lasting traditions in Poland. For over 60 years Polish shipyards have been constructing large installations and ships for national and international markets. The sector has shown, however, a significant decline over the last years, similar to much of the commercial shipbuilding sector across Europe that was active in mass segments like bulk carriers and container vessels. Gdansk Shipyard has built more than 1020 oceangoing vessels (trawlers, container carriers, reefers, bulkers, cargo vessels, passenger ferries, offshore vessels and others), which were delivered to various regions of the world. Some of the main players were privatized and diversified their businesses. An example of such development is the largest and probably most known Polish shipyard, Stocznia Gdańsk S.A.. It is active in shipbuilding (building offshore vessels, trawlers and ro-paxes for Norway, multipurpose vessels for Germany, gas carriers for Italy and trawlers for Russia), steel constructions as well as Wind Energy Towers. Polish shipbuilding is not only located in large shipyards (Gdańsk, Gdynia or Szczecin) but it also includes many small and medium shipyards specialized in the production of highest quality sailing yachts and luxurious motor yachts. There are approximately 1000 enterprises in Poland that produce yachts and sailing equipment. They produce approximately 6000 new yachts each year. These are mainly exported to Germany, Netherlands, France, Norway, Russia, USA, Australia and Arabic countries.

Shortsea shipping incl. RoRo

The most important ports in the Gdańsk Bay is the port of Gdańsk. Other smaller ports include Gdynia, Elblag and Kaliningrad ports. The first two are Polish ports while the latter is the Russian port located almost 70 nautical miles east-northeast of the Port of Gdańsk.

Gdańsk is a city in Poland that lies on the Baltic Sea coast. It is the fourth largest metropolitan area in Poland. The city lies on the southern edge of Gdańsk Bay. The total land area is 652 ha while the port water area covers



412.56 ha. The total length of the quays is 23.9 km. The Port of Gdańsk has an overall warehousing area of 107.022 m² and open storage area of 549 525 m². The maximum draught of vessels is 15 m in outer port and 10.2 m in the inner port. The overall cargo handling capacity is 70 million tonnes. Gdańsk is Poland's principal seaport and it handles: general cargo, containers, RoRo. Additionally, there are facilities within the port designated to handling coal, liquid fuels and liquefied gas, other cargo (including phosphorites, fertilizers, liquid chemicals, minerals, molasses, sulphur and aggregates, feeds, rye, wheat, barley, malt processing). There is also a Duty Free Zone within the port area.

Port of Gdynia handles container traffic from Hamburg, Bremerhaven, Rotterdam, Antwerp and Felixstowe through feeder connections. The quays at the Port of Gdynia are 17,700 meters long, out of which over 11,000 m is used for handling operations. The total area of the port is 755.4 hectares, including the land area of 508 hectares.

The Elblag Port is situated at the Vistula Lagoon. Its overall area is 470 ha with the total berth length of 2.5 km including 300 m for passenger handling. The Port of Elblag is a regional port that handles short sea shipping of cargo and passengers.

Table 2 Cargo handled in Polish seaports 1985-2010 (As of 31 Dec)

Year	1985	1990	1995	1996	1997	1998	1999	2000	2001
Cargo traffic total in k tonnes	50.131	47.039	49.320	48.993	50.985	50.996	49.679	47.871	47.754
of which: Gdańsk	18.119	18.613	18.608	16.875	18.200	20.624	18.793	16.712	17.913
of which: Gdynia	10.685	9.987	8.661	7.739	9.088	8.016	7.775	8.397	8.360
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cargo traffic total in k tonnes	48.966	51.885	56.918	54.769	53.131	52.434	48.833	45.079	59.507
of which: Gdańsk	17.487	21.631	24.078	22.478	22.034	19.944	17.072	18.758	26.421
of which: Gdynia	9.349	9.797	10.711	11.038	12.218	14.849	12.860	11.361	12.346

Source: Central Statistical Office, *Statistical yearbook of maritime economy, Warsaw, Szczecin, 2011*

Passenger ferry services & cruise

In Gdańsk, ferry services are operated by the Polferries Terminal. The Westerplatte Ferry Terminal is situated on the historic peninsula and within a 15-minute drive of the centre of Gdańsk. There is also a passenger ferry terminal present in Gdynia. There are more than seventy passenger ferries scheduled to arrive this year to the port of Gdynia until September 2012³. The port of Elblag also handles passenger traffic. The port handles 40 thousand passengers annually.

³ Website of the port of Gdynia, last accessed on the 10th of April 2012

Fisheries and aquaculture

Fishery forms a small part of Polish economy, it is however still relatively important to the economy of Polish coastal areas (Pomerania, West Pomerania and Warmińsko-mazurskie). The overall catches have been declining in the last two decades and the overall figures dropped from 630 thousand tonnes in 2000 to 220 thousand tonnes in 2010. Approximately 90% of the catches come from the Baltic Sea and the rest of the Atlantic Ocean. Catches include mainly sprats as well as herring, cod, flatfish, salts and krill. The fleet consists mainly of rather small and old fishing boats (approximately 800 units). The largest ships are registered at the ports of Gdańsk, Gdynia and Sopot (represent 6% of the overall fleet in Poland but they represent 60% of the overall fleet capacity)⁴. Production in the fishery processing is approximately 220 000 tonnes, with a growing production of smoked fish products. There are four stock exchanges on which the fish are marketed for the first time, there are also four producer organizations focused on coastal fisheries. Most of the fish processing takes place in the coastal areas. The largest enterprises that process sea fish are located next to the largest ports (Kołobrzeg, Gdańsk, Gdynia, Szczecin, Świnoujście, Władysławowo, Ustka)⁵. The fish consumption in Poland is small when compared to other European countries (approximately 10.5 kg per person annually, which is about 44% of the European average).

Polish aquaculture focuses only on inland fisheries. Currently, nearly 70% of freshwater fish production in Poland can be attributed to aquaculture in ponds, pools and other reservoirs. Rivers, lakes and dam reservoirs are also used for this purpose (remaining 30%).

Agriculture on saline soils

The Baltic Sea salinity is very small when compared to other seas and there are no tides. It is at the level of 7-8 PSU (Practical Salinity Unit) and within the Puck Bay it is only 2 PSU on average. The conditions for development of halophytes⁶ and growth of halophiles⁷ are, therefore, less favourable than at other coasts. The location of halophytes is also limited to specific sites where the sea waters can enter land areas⁸. These sites are not used for agricultural purposes in Poland but they are important natural reserve parks.

Within the Pomerania Natural Land Scape Parks, the Mechelińskie Łąki Park is characterized by the presence of halophile and half halophile areas. They are formed by the plants that prefer soils rich in salt⁹. Another natural reserve called Saline Meadows is located near Władysławowo at the beginning of the Hel Peninsula at the Bay of Puck. Within the area of 28 ha there are many strictly protected plants, including halophiles. The park is also a home for many rare bird species.

⁴ Jesús Iborra Martín, Rybolowstwo w Polsce, Opracowanie tematyczne, Parlament Europejski, DG ds. Polityk Wewnętrznych Unii, Departament Polityczny B: Polityka strukturalna I polityka spójności, 2011

⁵ <http://geografia.na6.pl/rybolowstwo-w-polsce>

⁶ Plants that grow in waters with high salinity levels

⁷ Small organisms that live in waters with high salinity levels

⁸ Jacek Herbich, Siedliska morskie I przybrzeżne. Nadmorskie I srodladowe solniska I wydmy. Poradniki ochrony siedlisk i gatunków, s. 86-96

⁹ Juncus gerardi, Blysmus rufus, Plantago maritima, Triglochin maritimum, Glaux maritima, Trifolium fragiferum, Bulboschoenus maritimus, Schoenoplectus tabernaemontani, and Eryngium maritimum, Carex arenaria, Ammophila arenaria, Elymus arenarius, and Cakile maritima, Salsola kali, Honckenya peploides Biblioteczka Programu Rolnośrodowiskowego 2007-2013, TRWAŁE UŻYTKI ZIELONE W PROGRAMIE ROLNOŚRODOWISKOWYM, Autor: Leszek Kucharski, Recenzent: Piotr Stypiński, Warszawa 2009

Energy and raw materials: Oil, gas and methane

Poland imports almost all of the crude oil from other countries. There are very small reserves of crude oil in Poland but they are located mainly onshore in the West of the country (80% in Barnówko – Mostno – Buszów). There is one drilling rig located within the Gdańsk Bay where crude oil is extracted from the seabed. It is located northwards from the Cape Rozewie.

The Liquid Fuel Terminal within the port of Gdańsk consists of four berths for handling of crude oil and crude oil derivatives. The handling technology is performed in a closed system, safe for the natural environment. The terminal is equipped with closed handling docks, antispill barriers and an antifire system. Through a system of pipelines and handling stations of PERN and Gdańsk Refinery, fuels can be delivered to refineries and plants within Poland and in the East Germany. The annual throughput capacity of the terminal amounts to 34 million tonnes. The terminal is owned by the Liquid Fuel Handling Company "Naftoport" Ltd, the services are rendered by the Cargo Handling and Storage Enterprise "Port Północny" Co. Ltd.

According to 2010 data, two thirds of the gas consumed in Poland is imported from Russia. The imports of gas come mainly through pipelines as well as through sea ports. The LPG Terminal in the Port of Gdańsk, located in the outer port, occupies an area of 11 ha. The terminal is suited for receiving, storing, partial mixing, and distributing - by means of tank cars and trucks - of liquefied gas: propane-butane. It has been designed for an annual throughput capacity of up to 500,000 tonnes. The terminal also constitutes a storage base for LPG in export relations. The storage base consists of 16 digged in tanks of a total storage capacity of 13,200 tonnes. All services are rendered by Gaspol SA - Gdańsk LPG Terminal. Poland has no connection to the Nord stream. Its development might effect in Poland's decreasing role as a gas transit country.

Only a few wells have been conducted so far and some gave positive results already. This includes deposits in the Lubocin area and Łebien area (Pomeranian). Further exploration of the shale gas resources and further development of this function are envisaged in the Gdańsk Bay cluster.

Offshore wind, ocean renewable energy & CCS

In Poland 95% of electricity is produced from coal, only 2.8% is generated by hydro plants (including pumped storage), about 2% from fuel oil and natural gas and as little as 0.3% from the other renewable sources (biomass, wind etc.)¹⁰. Poland has committed to increasing the share of energy from renewable resources to 7.5% by 2020, and part of this should come from offshore. The Pomeranian Voivodship has adopted a strategy in August 2010 aimed at increasing the role of renewable energy sources, including those from offshore sources.

In March 2012 a budget of EUR 4 billion has been granted for the development of energy infrastructure in the Baltic Sea region. It includes 43 projects of which 9 projects focus on the offshore wind energy. The technical potential of the offshore wind energy in Poland is estimated at 20 GW, while the market potential

¹⁰ Polish Member Committee of the World Energy Council, ENERGY SECTOR – WORLD AND POLAND, DEVELOPMENT 1971–2000, PROSPECTS TO 2030, *Author* Dr Jan Soliński, Secretary of the Polish MC/WEC, *Consultants* from Energy Institute Prof. Marek Jaczewski, Dr Janusz Rakowski, *Publisher* Polish Member Committee of the World Energy Council, Warsaw, April 2004, http://ultra.cto.us.edu.pl/~cabala/publ_pdf/Zrodla_energii.pdf

for 2020 is estimated at 1.5 GW¹¹. The wind conditions of Polish coasts are favourable but unstable. Until now, the costs of electricity from renewable resources in Poland exceed the costs of electricity from traditional resources¹².

Many companies worldwide are involved in works and tests on the usage of the wave's energy. There are no actual implementations of solutions that would not only acquire energy from the sea waves but that would also protect the coast from erosion (just pilot projects). In January 2012 a Polish company SKOTAN S.A. signed an agreement with the Polish Agency for Enterprise Development (PARP) for co-financing of the two year test phase aiming at acquiring energy from the sea waves. At the same time the project is aimed at increased coastal protection against abrasion (erosion)¹³.

The Polish Association of Offshore Wind Energy (Polskie Towarzystwo Morskiej Energetyki Wiatrowej) is currently involved in two European research projects. The South Baltic Offshore Energy Regions project is aimed at the identification of current industry capacity in terms of products and services which can be used in the construction of offshore wind farms. Within the Wind Energy in the Baltic Sea Region 2 project the analysis of national legislation governing the implementation of wind farms and preparation of recommendations is done. The authorities at central, regional and local level are taken into account and a set of recommendations is being prepared¹⁴.

In April 2012 first decisions were taken to allow the construction of wind farms on the Polish Baltic Sea coast¹⁵. This refers to the construction of five wind farms with an overall production capacity of 4500 MW. Fifty nine applications have been submitted so far to the national authorities for the location on wind farms. Some forty locations are envisaged near Słupsk (at least 12 nautical miles from the shore). Each wind farm is envisaged to have dozens to hundreds to wind mills. It is envisaged that the first wind farms will be built within ten years. The Maritime Office in Gdynia is responsible for the decision on the final location of the farms. The generation of decisions will lead to gathering some PLN 200 million to the national budget (that is approximately EUR 50 million). The wind farms construction industry is foreseen to generate up to EUR 700 million annually and to generate up to 9.000 jobs in the industry and services related. It should also significantly contribute to meeting the country's commitments regarding the share of the energy from renewable resources in the overall energy production. Additionally, on the 25th of April 2012 the Minister's Council issued a decision allowing for creation of a wind turbine tower factory in the Pomerania Special Economic Zone in Gdynia¹⁶. The overall investment will be PLN 90 million (EUR 22.5 million) and it will lead to the creation of 50 work places. The factory will produce the wind turbine towers, pipe constructions for oil rigs and floating dock-towers. The factory will be operational by the end of 2014.

Aggregate mining

The mining resources of the Gdańsk Bay both onshore and offshore are limited. They include sand, gravel, clay, lake chalk and peat used mainly for construction. Significant deposits of rock salt can be found in the

¹¹ Gospodarcze i społeczne aspekty rozwoju morskiej energetyki wiatrowej w Polsce, Instytut Energetyki Odnawialnej, Opracowanie wykonane na zlecenie Polskiego Towarzystwa Energetyki Wiatrowej oraz Forum okretowego w Gdańsku, Autorzy: Grzegorz Wiśniewski, Katarzyna Michałowska-Knap, Piotr Dziamski, Paweł Regulski, Warszawa, maj 2010

¹² <http://agnieszkakaczmarczyk.wordpress.com/2012/02/23/>

¹³ <http://www.skotansa.pl/index.php?strona=8&wiecej=84>

¹⁴ <http://www.ptmew.pl/pl/strona-glowna.php>

¹⁵ <http://portalmorski.pl/offshore/energia-odnawialna/21228-rzad-daje-pozwolenia-na-silownie-wiatrowe-na-pomorz>

¹⁶ <http://portalmorski.pl/offshore/energia-odnawialna/31772-w-gdyni-ruszy-fabryka-morskich-farm-wiatrowych>

region (Łeba, Mechelinki and Puck Bay) and potassium-magnesium salt (Chłapowo, Mieroszyno, Swarzewo, Zdrada). They create the most favourable conditions to build cavern storage tanks for natural gas, liquid fuels or oil in the whole country. Additionally, there are numerous places rich in amber. The deposits in Możdżanów near Słupsk and in Wiślinka near Gdańsk are being exploited. Pomerania region is famous for its exquisite amber jewellery.

Coastline tourism

Pomerania is the most popular holiday destination in Poland. Out of all tourists in 2009 (30.8 million), more than 12% came to Pomerania (3,7 million) and 6,5% visited Warmińsko-mazurskie voivodship (long and short stay tourists together)¹⁷. Most of them were coastline tourists who came from Poland while approximately 18 percent of tourists visiting the Pomeranian Voivodship in 2011 came from abroad. The largest group of foreigners were Germans (average for Poland 26%, for Gdańsk region they constituted more than 40% of international tourists¹⁸). There is a large variety of tourist accommodations available in the region (86 thousand beds). Most hotels are based in Gdańsk, Sopot and in smaller towns located along the Bay of Puck.

Warmińsko-mazurskie Voivodship has also a well-developed tourism infrastructure. It is one of the most attractive touristic regions of the country (last year more than 800 thousand people visited the region). Most of the foreign tourists come from Germany.

The Pomerania region has the resources of groundwater used for medical purposes. The most famous ones are located in Sopot and Ustka. The area is also characterized by the presence of peloids that consist of humus and minerals formed over many years. This mud is used for therapeutical purposes, as part of balneotherapy or therapeutic bathing. The peloids occur less often than normal peat. The largest resource of 196 thousand tonnes is located near Ustka¹⁹.

Yachting and marinas

There is a number of marinas on the Polish coast. They are well equipped and provide good facilities for tourists sailing along the Polish sea coast. The most famous and the largest ones are based in large port cities such as Gdańsk and Gdynia. There are, however, a lot of the smaller resorts, where many marinas have been constructed next to or in place of small fishing ports.

Yachting is a popular leisure activity along the Polish sea coast. It is, however, much more developed inland. Warmińsko-mazurskie voivodship is also often called the Land of Great Masuria Lakes (Kraina Wielkich Jezior mazurskich).

¹⁷ Polish Tourism Institute Data, http://www.intur.com.pl/jurek_09.htm#krajowe09

¹⁸ http://dms.msport.gov.pl/app/document/file/2338/synteza_2011.pdf?field=file1

¹⁹ „Plan zagospodarowania przestrzennego województwa pomorskiego”, Gdańsk 2009



Source: <http://www.ourmasuriamiracleofnature.pl/>

The Land of Great Masuria Lakes is a unique area both on Polish and European scale. The natural beauty of the area is preserved while it is also full of historical monuments. The number of lovers of water sports, fishing and other tourists coming to the region has been increasing over the years and it has a great potential for further increase. Great Masurian Lakes are famous for countless rare bird habitats (cormorant, grebe, coot, heron and mute swan).

Coastal protection

Just like in many coastal areas throughout the world, the coast in Poland also requires protection. There are a few places that require special attention. Hel Peninsula is one of them. During storms water pours into the Bay of Puck through the narrowest stretch of land near Chałupy. This is a result of the construction of a breakwater that was built to protect the city of Władysławowo. The construction stopped the natural torrent building the debris²⁰.



A recently implemented project aimed at protection of the coastline of Hel (including protection of the lighthouse in Rozewie) by reconstruction of the degraded coastline in Pomerania. This was an EU co-funded project (overall value of EUR 16 million).

The Natura 2000 network has been developed in order to protect European fauna and flora. Important Bird Areas are set in order to protect the areas of large concentrations of birds (nesting, feeding, flights) while the Important Habitat Areas were developed to protect fauna and flora species that are endangered species.

²⁰ <http://www.turystycznapolska.pl/index.php/pol/Wiadomosci/2009/wrzesien/Ochrona-Helu-i-Rozewia-przed-zalaniem>

There are now 64 Natura 2000 areas in the Pomerania Voivodship, including 13 Important Bird Areas and 51 Important Habitat Areas (following the EEC Council Directive 79/409/EEG of 2 April 1979 and EEC Council Directive of 21 Mar 1992)²¹. A few years ago the results of tests of the bottom sediments conducted in the Port of Gdynia showed various irregularities at the premises of Westway Terminal Poland Sp. z o.o. After the decision of the Regional Director for Environment Protection in Gdańsk was issued, the company responsible for the damages has successfully implemented the reclamation of the area concerned. In 2011 the Gdynia Port Authority acquired new areas for its expansion. The initial tests show that the levels of petroleum substances are exceeded at the areas concerned. Currently, a detailed analysis is being conducted and the reclamation plan is under preparation.

Both the Port of Gdańsk and Port of Gdynia guarantee the reception of waste generated during the sea vessel operation as stipulated under the MARPOL 73/78 Convention (Waste oils and their mixtures, Solid waste, Sewage, Exhaust cleaning residues). All measures aimed at emergency and pollution control are also implemented.

Maritime Security and Surveillance

In 1997 Baltic Sea Region Border Control Co-operation (BSRBCC²²) was formally established as a platform for co-operation between border/coast guard services in the region, focusing on the border surveillance, preventing and combating trans-border crime with particular emphasis on illegal migration, smuggling of goods, as well as violations of the existing regulations in maritime areas²³. Poland is one of the members of the BSRBCC²⁴. The main partner is European Agency for the Management of Operational Cooperation at the External Borders of the Member States (Frontex)²⁵.

Environmental monitoring

The environmental monitoring programme in Poland provides a basis for implementing measures aimed at improving the state of the Baltic Sea ecosystem and its protection against contamination. The monitoring focuses on the transitional and coastal waters with respect to its physio-chemical elements, chemical and biological agents. The monitoring of inland waters is done by the regional environmental inspectorates. The monitoring of the Baltic deep-water zone is the responsibility of the State Inspectorate for Environmental Protection and it is performed by the Maritime Institute in Gdańsk²⁶.

Current monitoring programs are primarily aimed at the control of aquatic environment with focus on seasonal variations. The monitoring data is primarily used to develop an overall assessment of the environmental impacts of infrastructure investments. In individual cases, dedicated monitoring programs can be implemented (before, during and after the investment).

²¹ M. Buliński, R. Knitter, Z. Lenartowicz, Aktualny stan ekologicznej sieci obszarów Natura 2000 w województwie pomorskim, Zespół Dokumentacji Przyrodniczej Pomorskiego Urzędu Wojewódzkiego, http://www.google.com/url?sa=t&rct=j&q=natura%202000%20pomorze&source=web&cd=1&ved=0CGUQFJAA&url=http%3A%2F%2Fbip.gdos.gov.pl%2Fdoc%2F2008_12%2FPrezentacja_Natura_2000_6_XI_2008_bez_zdjec.ppt&ei=HhypT-SmKueT0QX6rJnuAw&usq=AFQjCNGW7PROgbnJ_5wSEGfBijSbgPMqCQ

²² www.bsrbcc.org

²³ <http://www.morski.strazgraniczna.pl/eng/index.htm>

²⁴ Denmark, Estonia, Russian Federation, Finland, Lithuania, Latvia, Germany, Norway, Poland, Sweden and Iceland - as an observer

²⁵ www.frontex.europa.eu

²⁶ http://www.im.gda.pl/images/Aktualnosci/konferencja/2011-09-27_Gdynia_Krzymi%C5%84ski_Mykieta.pdf

Concluding remarks

For many years Gdańsk served as a major transport and trade node in Poland. In the 1960s and 1970s the traditional maritime industries were supported by the government and shipyards played an important role in the area's economy. The opening of the market and decline in the world demand for ships led to the decline of this industry. Initially a challenge for the regional economy led to diversification of the production and services offered in the region in a longer term. Construction of small luxurious yachts, motor boats and tourism development became extremely important for Pomerania and Warmińsko-mazurskie. New sectors show potential for development such as renewable energy and building of wind energy constructions. They are expected to show strong growth in the future and provide inclusive jobs. Table 3 presents an overview of the functions in the Gdańsk Bay cluster.

Table 3 Importance and growth potential of functions in Gdańsk Bay cluster

Function	Sub-function	Important for the region (in the past)	Important for the region (nowadays)	Important for the region (growth potential for future)
Maritime transport and shipbuilding	Deep sea	√√	√√	√
	Short sea	√	√√	√
	Passenger ferries	√	√	√
	Inland waterway			√
Living resources	Fish for humans	√	√	
Energy & raw materials	Oil and gas	√	√	√
	Offshore wind			√√
	Ocean renewable energy			√√
Leisure, working & living	Coastline tourism	√	√√	√√
	Yachting and marinas	√	√	√√
	Working		√	√
	Living		√	
Coastal protection	Protection against flood		√	
	Protect habitats		√√	√
Marine surveillance	Maritime security & surveillance		√	
	Environmental monitoring		√	√

Source: <http://www.trojmiasto.pl/>

2.4 Synergies and tensions

Synergies addressed

On a limited amount of space, especially in the Pomerania voivodship, a number of functions can be identified. First of all, the cities of Gdańsk, Gdynia and Sopot are all located in a very close proximity from one another. Each of the cities of the so called Tri-city is different from the other. Gdańsk is a well developed touristic base, has the largest port in Poland and has various historical monuments and traditions. Gdynia is a so called port city while Sopot is a typical touristic destination with beautiful resorts and clean beaches. Together with the Hel peninsula, they form a perfect combination of various economic functions in the

region. This leads to economic spin-offs and spin-ons. A large number of stakeholders in a number of sectors are located in the area which provides opportunities for intensified cooperation and new initiatives development.

The location and proximity of Gdańsk and Gdynia ports are also important when creating work places. The ports are important employers in the region but they also lead to development of various maritime related sectors. These include logistics services development, refinery of oil products, fisheries and fish processing, etc. Additionally, the redevelopment activities of the old port buildings and areas take place in the region. The buildings previously used for example for storage of goods but located in the old port locations are reconstructed and play nowadays different roles. The first example can be found in the historic city centre of Gdańsk where the buildings previously used for storage of goods have been redeveloped and they serve as luxurious lofts or restaurants. Another example is the area formerly used by the naval shipyard that is currently being redeveloped in order to provide additional storage space for the port of Gdynia. We can, therefore, observe a shift in functions from fisheries (declined) to tourism (growing).

The traditional shipyard industry has declined over time. The shipyards have been restructured and some had been privatized. The role of their core business has decreased and the businesses have diversified. As a result of these changes, the current portfolio of the enterprises (formerly just shipyards) is much broader. Besides construction of sea vessels and their repairs, they produce various large constructions for different sectors as well as they produce infrastructures for the offshore industry. As a developing sector, the offshore energy does not play an important role in Poland nowadays. It has, however, a strong potential for development and it is expected to bring up to some 9,000 jobs in the coming years.

Finally, a synergy can be observed between the declining fishery sector and increasing role of tourism with respect to yachting and marinas. Many marinas have been constructed in the last two decades in place of or next to a number of small fishing ports along the coastline.

Synergies not yet addressed

In the last years a strong development of port related functions has been observed. These were mainly focused on deep sea shipping, short sea shipping and related services. These functions create synergies between each other and it is expected that they will continue to grow in the coming future. The growth of these functions translated directly to the increased need of specialized staff that can fill in the new positions. Strong development of competences is crucial in the area of fast developing logistics services (storage, transport, freight forwarding, supply chain management, etc.). A renewal of the engineering and technical capacities potential is also needed. The focus should be put on the design and sea based skills (the exception is sea-farers).

The offshore energy sector shows strong growth potential both in terms of future production of energy from renewable energy sources as well as from the industry that starts to produce the necessary offshore equipment and appliances. It is important that the current shipyards and other companies can maintain and further develop their production and repair potential. This potential synergy is not fully addressed at present but it has a potential for future.

Potential tensions

The following tensions between the economic functions have been identified in the Gdańsk Bay cluster:

- Spatial & functional tensions:

- development of the port activities (port area, sea traffic, inland traffic) versus protection of environment and habitats
 - potential capacity constraints in ports of Gdańsk (DCT) and Gdynia
 - offshore wind, ocean renewable energy development versus protection of environment and habitats
- Other tensions:
- insufficient key personnel in logistics, lack of schools and logistics teaching programmes
 - Maritime Institutes have a strong position in the region (stronger than the Technical Universities or Economic Schools) which can create knowledge spin-offs as well as tensions between the academic centres

2.5 Main stakeholders

The Pomerania Voivodship Marshall's Office is capable of creating maritime policy as well as of gaining political support for its initiatives both on national and international level. The main persons involved in the regional cooperation are three active representatives of the Tri-city governments (Pawel Adamowicz, Wojciech Szczurek, Jacek Karnowski, Mieczyslaw Struk, etc.); EU Commissioner Financial Programming and Budget Mr Janusz Lewandowski, various MEPs such as Anna Wypych-Namiołko, Katarzyna Sobierajska, the prime minister Donald Tusk and the Infrastructure Minister Mr Sławomir Nowak (both come from Pomerania). Additionally the office is capable of creating the framework for improving the academic and educational conditions.

The Polytechnic University of Gdańsk and the Maritime University in Gdańsk are the most important academic institutes in the region. They contribute to the development of the maritime related engineering competences as well as other sea related competences.

The most relevant institutes focused on environmental protection and monitoring are the Institute of Oceanology²⁷ of the Polish Academy of Sciences (IO-PAN) in Sopot, Maritime Institute in Gdańsk and are the Institute of Oceanology of the University of Gdańsk. Together with below mentioned institutes focusing on fisheries, they form a strong competence centre focused on marine studies.

Strategic Directions of IO PAN Research focus on the following:

- Role of the oceans in climate change and its effects for the European Seas
- Natural and anthropogenic variability of the Baltic Sea environment
- Contemporary changes of the coastal ecosystems in the shelf seas
- Genetic and physiological mechanisms of functioning marine organisms; principles of marine biotechnology

There are two main research institutes engaged in research on fisheries: National Marine Fisheries Research Institute in Gdynia and Inland Fisheries Institute in Olsztyn. Other centres involved in marine research are the Marine Fisheries Division at the Agricultural University and Maritime University in Szczecin, Institute of Oceanography at the Polish Academy of Sciences in Sopot and the Center for Marine Biology at the Polish Academy of Sciences in Gdynia.

²⁷ <http://www.iopan.gda.pl/>

The most important business associations are The Employers Association Ship Forum (industry) and the Polish Chamber of Maritime Commerce (ports and transport). According to the interviewee, both of the associations are not strong enough to set the directions for development of their respective sectors. The Polish Shipowners Association is a member of CESA -Community of European Shipyards` Associations. It is dominated by one company (Polska Żegluga Morska).

The Polish Offshore Wind Energy Society (Polskie Towarzystwo Morskiej Energetyki Wiatrowej in Gdańsk has a potential to increase its role in the future.

Sea-related clusters

The Polish Maritime Cluster Platform²⁸ creates a network for the members and associated partners of the two regional associations: Pomeranian Sea and Vistula Catchment Basin Cluster, Gdynia registered in October 2009 and West Pomeranian Maritime Cluster, Szczecin, registered in June 2008. The associations cluster near 100 individual experts from administration executives, national/regional, business, and education. The sectors and functions that they cover include:

- traditional maritime sectors (inland navigation, marine aggregate, marine equipment, maritime services, maritime works, navy and coastguard, offshore supply, recreational boating, seaports, shipbuilding, shipping),
- coastal and sea-related (marine) recreation and tourism (coastal tourism, cruise tourism)
- fisheries (maritime and inland fishing, fish processing, aquaculture).

The Polish Maritime Cluster Platform belongs to the European Network of Maritime Clusters (ENMC) of 13 countries. One of its achievements includes contribution to the hearing of ENMC with the Commissioner for Maritime Affairs and Fisheries on April 28th 2010 with the proposal to the Commissioner to introduce the standard definitions of maritime sectors and subsectors, for conformity in EU Member States.

Among other initiatives, the Platform is a member of the FP7 programme project "Develop a Baltic Sea Region Programme for Innovation, Clusters and SME-Network". The mission of the Polish Maritime Cluster Platform is to promote and reinforce the Polish maritime sectors and to put the entirety of the Polish maritime cluster on the map.

The main goal of the Pomeranian Sea and Vistula Catchment Basin Cluster was originally the generation and exploitation of the synergies between Tri-city ports and hinterland. The focus of the Cluster has been gradually shifting towards the DCT hub services. The cluster managed to develop an image strong enough to be recognizable on the European scale. Currently, however, the cluster is active only to a very limited extent.

The Baltic Eco-Energy Cluster (BEEC) is a common initiative of the PAS Institute of Fluid-Flow Machinery, University of Warmia and Mazury, Gdańsk University of Technology, Koszalin University of Technology, Marshals and Self-Governments of the Pomorskie and Warmińsko-mazurskie Voivodships, as well as the economic units and associations having their seats in those voivodships. Geographically, BEEC's activity covers the area of Northern Poland from Koszalin through Pomorskie Voivodship to eastern confines of Warmińsko-mazurskie Voivodship²⁹. The main mission of BEEC is to introduce and promote a widely

²⁸ <http://www.tci-network.org/cluster/initiative/3851>

²⁹ <http://www.imp.gda.pl/bkee/>

understood idea of distributed co-generation, understood as simultaneous small and medium scale production of thermal energy and electricity from renewable energy sources, mainly biomass, but also by converting water, solar and wind energy.

2.6 Governance and integrated policy responses

Policy responses that have been implemented to develop synergies

The Pomerania regional government plays an important role in ensuring favourable framework conditions for the region's economic development. The Marshall's Office, especially in the last few years, is very active and supports various sea related initiatives. The office has been an active promoter of a number of initiatives that include port and transport infrastructure development, cluster formation, renewable energy development, knowledge sharing, etc. The role of the regional government is broader than the region itself. The government cooperates with the adjoining voivodships in a number of initiatives (for example inland waterways development, cluster formation, etc.). Additionally, the government has strong leadership and well established ties with the national government. This ensures a faster implementation of various regional or local initiatives that require decision at the national level. Finally, the regional government is also active in a number of international initiatives focused on the development of Baltic Sea region (Baltic seaway and international corridors). The regional government enables the development of various functional synergies.

In March 2012 an agreement on the development of the inland waterway E40 (relevant section between Gdansk – Warsaw) was reached between the Voivodships Marshalls³⁰. The agreement focuses on the development of the section Gdańsk-Bydgoszcz-Toruń and Warsaw of the waterway. The signatories of the document are the regional governments of Kujawsko-Pomorskie, Pomerania and Mazovia Voivodships. The regional government of Kujawsko-Pomorskie Voivodship will coordinating actions aimed at the revitalization and economic revival of selected section of E40, being part inland route connecting the Baltic Sea with the Black Sea.

Before this large initiative, an agreement aimed at development of the international inland waterway E-70 was reached (July 2011)³¹. The initial talks about the cooperation between regions in this respect started in 2006. The agreement was signed by five regional governments including: Kujawsko - Pomorskie, Wielkopolskie, Pomerania, Warmińsko-mazurskie and Lubuskie Voivodships and includes an action plan for the development of the waterway in the years 2012 to 2014.

The Marshall's Office in Gdańsk has been recently also active in the field of cluster development and competences creation. On the 16th of March 2012 approximately 48 institutions signed an intention letter on the creation of Pomeranian Group of Cluster competences³². The signatories of the letter involved businesses from Pomerania region, research and development institutes, entities aimed at innovation as well as representatives from regional and local governments. The initiative is aimed at further development of the existing synergies in the region within and between different sectors.

In April 2012 a new Maritime Scientific Consortium was initiated. It is a result of an agreement of five scientific institutes in order to conduct joint research focused on the protection of Baltic Sea waters and the

³⁰ http://www.kujawsko-pomorskie.pl/index.php?option=com_content&task=view&id=20978&Itemid=1

³¹ <http://www.elnews.pl/index.php/artykul/pokaz/1268>

³² <http://innopomorze.pomorskie.eu/aktualnosci/pomorskiej-grupy-kompetencji-klastrowych-powolana.html>

use of the marine resources. The institutes involved are the Institute of Oceanology of the Polish Academy of Sciences (IO-PAN) in Sopot, National Marine Fisheries Research Institute in Gdynia, Institute of Meteorology and Water Management in Warsaw, National Geological Institute in Warsaw and Maritime Institute in Gdańsk³³. The initiative is aimed at further development of scientific and research cooperation of the leading maritime institutes and schools in the country.

Another interesting initiative is the National Centre for Baltic Studies (Narodowe Centrum Badań Bałtyckich) that was created in 2011³⁴. The centre integrates scientific institutions and academic centers and it is aimed at efficient management and sustainable development of Baltic coast marine environment and at enhancing the maritime innovation. The project is a unique initiative focused on exploration and development of new ways of cooperation between scientific and academic institutions, local government, public administration and business in order to develop an efficient and innovative maritime policy.

Besides the above mentioned larger initiatives, there are many small and rather scattered initiatives on a rather local scale.

Lessons to be learned

The Gdańsk Bay cluster is a region with strong and developing economy, long traditions and breath-taking landscapes. Over the years, the region has changed and diversified. A number of strong economic functions have been identified which create various synergies and may lead to potential tensions. The Gdańsk Bay cluster is a unique region in Europe. Some lessons, however, can be drawn from its development over the years and some important aspects can be transferred to other economic regions in Europe.

The first important issue worth mentioning is the role of the regional government in the economic development of the Gdańsk Bay cluster. The Pomeranian government is very active both on the local, regional, interregional and national scale. This ensures a framework for quick advancement of investments and support for decision making process on various levels. Strong leadership plays an important role here. The Pomerania Marshall's Office is a very good example throughout Europe on how the functioning of the governmental structures can positively impact the regional development.

Another important issue is the regional cooperation with other countries located at the Baltic Sea basin. Poland, mainly through the persons active in the Gdańsk region, is an active member in a number of international initiatives. A large number of projects and initiatives are focused on the South Baltic Cross-border Co-operation Programme 2007 – 2013. The overall objective of the Programme is to strengthen the sustainable development of the South Baltic area through joint actions increasing its competitiveness and enhancing integration among people and institutions. Priorities of the South Baltic Programme are: Economic competitiveness and Attractiveness and common identity. Poland participated in the total of 96 number of project within the Programme in the first and second calls of the Programme³⁵. Poland is active in the EC FP7 programme. The examples of projects include:

- StarDust - The Strategic Project on Trans-national Commercial Activities in Research & Innovation, Clusters and in SME-Networks³⁶,

³³ http://www.pi.gov.pl/PARP/chapter_86197.asp?soid=532B93D613124A529B855C216A6C5E59

³⁴ <http://www.ocean.ug.edu.pl/pages/posts/2011.07.05-br-narodowe-centrum-badan-baltyckich-ncbb---spotkanie-5.07.2011-r-101.php>

³⁵ <http://eu.baltic.net/redaktion/download.php?id=1269&type=file>

³⁶ http://eu.baltic.net/Project_Database.5308.html?contentid=52&contentaction=single

- South Baltic Offshore Energy Regions project - identification of current industry capacity in terms of products and services which can be used in the construction of offshore wind farms,
- Wind Energy in the Baltic Sea Region 2 project - analysis of national legislation governing the implementation of wind farms and preparation of recommendations³⁷,
- BONITA - Baltic Organisation and network of Innovation Transfer Associations³⁸,
- Baltic Sea Region (BSR) InnoReg project, One of the main outputs of BSR InnoReg is the Baltic Innovation Policy Memorandum³⁹,
- SoNorA Improving transport infrastructure and services across Central Europe⁴⁰,
- Generation Balt project - match-making between high-profile job-seekers and employers in the maritime-related professions⁴¹.
- BaltSeaPlan project - accompanies the EU Maritime Policy by supporting the introduction of Integrated Maritime Spatial Planning and preparation of National Maritime Strategies within Baltic Sea Region. It also contributes to the implementation of the HELCOM recommendation on broad-scale Maritime Spatial Planning and the VASAB Gdańsk Declaration.
- The INTERREG III B BSR BaltCoast project originated from the 5th Conference of Ministers Responsible for Spatial Planning and Development in the Baltic Sea Region and was a part of the "VASAB 2010 Spatial Development Action Programme".
- VASAB - Intergovernmental multilateral co-operation of 11 countries of the Baltic Sea Region in spatial planning and development guided by the [Conference of Ministers](#) responsible for spatial planning and development, steered by the [Committee on Spatial Planning and Development of the Baltic Sea Region \(CSPD/BSR\)](#) composed of representatives of respective ministries and regional authorities.

Finally, an important lesson for other European regions is need for diversification of the industry and services of the coastal regions. In the past the economy of the region heavily relied on traditional maritime industries. The demand for these has decreased drastically and the regional economy experienced a decline. Thanks to the diversification of industries and services, the region is developing and providing work places for many people. An example of such diversification is the transformation of a number of shipyards to multi-sector enterprises.

2.7 Literature

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2.8 List of interviewees

Name	Institution
Piotr Dwojacki, CEO	Academic Initiative Foundation in Gdynia (the Foundation plays a role of the academic entrepreneur incubator and technology transfer centre).
Dr Magdalena Kłopot	Gdynia Maritime University
Dr Robert Marek	Gdynia Maritime University

3 Ireland⁴²

3.1 Summary and highlights

- 1) Ireland is a maritime nation with a relatively small and underdeveloped ocean economy in relation to its available marine resources and sea territories (total population: 4.5 million; estimate marine GVA: €1.44 billion (1% of total GDP); Claimed sea territories: 880,000 km²).
- 2) Recognising the benefits of a cluster approach, given its small size and limited financial and human resources, the focus for development has been to mobilise a national effort to maximise sustainable marine resource development on a national rather than a regional basis, i.e. to foster national co-operation, mobilising national investment, capacities and infrastructures to focus on external / global markets rather than encourage internal competition between regions within Ireland.
- 3) Within that context, the Irish Marine Institute is a vital actor to roll-out Blue Growth on the ground – in both operational and strategic terms. Via its coordination and engagement in national and EU co-funded projects it provides an entry point for local actors to international markets, as well as for international players to the Irish market. On a strategic level, it contributes to the formulation of policy strategies in support of maritime economic synergies. Via its local offices, it liaises with relevant stakeholder groups on the ground and seeks to minimize tensions between local actors.
- 4) The Irish ocean economy cluster approach involves establishing cooperation between research institutes, universities, SMEs and larger companies in all corners of the country. Places like Galway, Cork ... and Dublin all play a role and synergies are being sought within these places as well as linking networks across the country.
- 5) Synergies exist in the following fields:
 - From sector to sector: marine biotechnology and biopharma, marine biotechnology and medical devices industry, ocean energy and short-sea shipping services, ocean energy and fishing (from a spatial planning point of view)
 - From sea-based to land-based technologies and skills, e.g. in maritime monitoring and surveillance to use the data generated on the sea about wave and tidal from the office
- 6) Lessons to be learned:
 - Strong research institutes around the maritime economic activities bolster economic activities and synergies in the region
 - Local bottom-up approaches, e.g. in the case of positioning the city as prime destination for marine sports tourism or to attract more cruise liners can help to grow a sector
 - Develop informal stakeholder meetings to prepare policy actions and to use their input for a reflection on tensions and synergies for the maritime economy. Besides, local industrial partnership committees in the form of round table meetings can help to overcome existing barriers and tensions of collaboration between different sectors.
 - Synergies can only be materialized through a strong leadership, in Ireland through the Irish Marine Institute which is fostering synergies at political level (through contribution to shaping the maritime policy agenda on national and EU level), research (through coordinating various national and EU research programmes on emerging sectors) and operational level (regional roundtables between sectors etc.)

⁴² Please note that this case study is based on desk research and qualitative interviews with Irish marine stakeholders. It is the view of the consortium conducting the Blue Growth study (Ecorys, Deltares, Oceanic Developpement), hence it does not present an official statement of the Irish Marine Institute or any other marine stakeholder.

3.2 General description of Ireland

Ireland is an island on the Atlantic periphery of the European Union, located to the northwest of continental Europe. It is the third largest island in Europe and the twentieth-largest island on Earth. The island of Ireland consists of a land mass of 84,421 km², made up of the Republic of Ireland (Population: 4.6m, Land area: 70,282 km²) and Northern Ireland (Population: 1.8m; Land mass: 14,139 km²), which is part of the UK.

The marine resources (compare also Annex II) and its claimed maritime territories (880,000 km²) of the Republic of Ireland are significant though they are considered underdeveloped.

Maritime economy in Ireland

In 2007, the direct economic value of the Irish ocean economy was €1.44 billion or approximately 1% of the Irish GDP. The turnover of the sector was €3.4 billion and the estimated employment provided was close to 17,000⁴³, equal to 1% of the total workforce in Ireland at the time.⁴⁴ Compared to the reference year (2003), for 2007 a 34 % increase in turnover, 6.5% in employment rise and 40% increase in direct gross added-value (GVA) was recorded.⁴⁵

The Irish Ocean Economy (2007)

Direct GVA:	€1.44 billion
GDP (%):	1%
Turnover:	€3.4 billion
Direct/Indirect GVA:	€2.4 billion
Employment:	17,000 FTE
Workforce (%):	1%

Source: Irish Marine Institute

The Irish ocean economy comprises a multitude of small, medium and large enterprises operating across a spectrum of sectors. 94% of these enterprises are in established ocean industries (e.g. shipping & maritime transport, water-based tourism and leisure, seafood processing, fisheries, aquaculture, marine manufacturing, marine services and oil and gas) with seafood and tourism representing 60% of this. New & Emerging Ocean Industries (e.g. Renewable Ocean Energy, Marine Commerce, High-Tech Services and Marine Biotechnology) represent 6% of turnover. According to global market forecasts undertaken by the Marine Institute^{46 47} these emerging sectors, combined with more established sectors, offer significant potential for sustainable economic growth.

In terms of regional and rural development, Ireland's ocean economy is distributed widely throughout the country, with a large proportion occurring outside the most developed regions. This is particularly true of many of the activities involved in the commercial exploitation of primary marine resources e.g. commercial fishing, aquaculture and seaweed harvesting have an important role in the development of many regional economies particularly along the western seaboard and play a key role in rural development; providing livelihood options in rural areas where few other employment or income sources exist. Marine tourism and leisure activities offer further opportunities for rural development in the less developed coastal regions of the country and also offer an alternative to fishing communities wishing to diversify into other marine- based activities.

⁴³ Ireland's Ocean Economy, 2010: 3.

⁴⁴ Ireland's Ocean Economy (2010) Socio-Economic Marine Research Unit, NUI-Galway. 48pp.

⁴⁵ Figures, however, have peaked during the period 2003 – 2007, with considerable increase of economic activity in shipping, maritime transport and water-based tourism and leisure

⁴⁶ Marine Institute (2005). Marine industries global market analysis. Marine Foresight Series No. 1. Marine Institute.

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Marine economic foresight exercise

Paralleling the development of the EU Green Paper: Towards a future Maritime Policy for the European Union: A European Vision for the Seas and Oceans (2006) and the subsequent Integrated Maritime Policy for the European Union (2007), between 2005-2006, a Foresight Initiative⁴⁸ was undertaken to assist the existing and largely indigenous Irish marine sub-sectors to improve their overall competitiveness and to identify new knowledge-based opportunities based on the development of marine resources. This foresight exercise resulted in the Sea Change Strategy: A Marine Knowledge, Research & Innovation Strategy for Ireland: 2007-2013⁴⁹.

The foresight study highlighted a number of areas for development and identified the need to strengthen and/or develop research, technology, development and innovation capacity, specialist infrastructures (e.g. wave energy test and demonstration facilities) and services (e.g. seabed mapping) to support this development. National research funds from the national Strategy for Science, Technology and Innovation (SSTI) Programme were used to develop new capacity in identified gap areas, including in:

- Ecosystem Approach To Fisheries/Environmental Management
- Marine Economic and Social Research
- Marine Sensors and Communications Marine Biodiscovery / Biotechnology
- Fish Population Genetics
- Renewable Ocean Energy
- Marine Functional Foods

Ireland is an **Innovation follower** with an above average performance. Relative strengths are in human resources, open, excellent and attractive research systems and economic effects. Relative weaknesses are in finance and support, linkages & entrepreneurship, intellectual assets and innovators.

Source: Innovation Union Score Board 2011

Investments were made primarily in human capacity building, mobilising existing resources and investments and encouraging inter-disciplinary and inter-institutional co-operation and North-South collaboration.

The governance and government structures of Ireland

In terms of governance, the Republic of Ireland has a relatively centralised administration. Responsibility of ocean governance is spread across a number of Government Departments (Ministries) though is increasingly focussed on the Dept of Agriculture, Food and the Marine. An Inter-Department Marine Co-Ordination Group, chaired by the Minister for Agriculture, Food and the Marine and hosted by the Department of An Taoiseach (Prime Minister) was established in 2009 to better co-ordinate policies and strategies related to the sustainable development of marine resources, including the Integrated Maritime Policy for the European Union (2007), the Marine Strategy Framework Directive (2008) and the European Union Strategy for the Atlantic (2011).

The country is further designated into two NUTS II Regions, with two Regional Assemblies (BMW: Border, Midlands and Western Regional Authority; S&E: Southern and Eastern Regional Assembly) being responsible for managing the Objective 2 Regional Competitiveness & Employment programmes. The NUTS status of these Regions is currently under review as part of the preparations for the next Multi-annual Financial Framework (2014-2020).

⁴⁸ Marine Institute (2006) *Sea Change (2007-2013) Part II: Marine Foresight Exercise for Ireland*. 202pp.

⁴⁹ Marine Institute (2006) *Sea Change A Marine Knowledge, Research & Innovation Strategy for Ireland: 2007-2013*. 138pp.

3.3 Socio-economic characteristics

The economy of Ireland is currently in a period of transition, shifting from a dependency on agriculture sectors to a greater role for the high-tech and services sectors. The country has a rather young and well educated workforce. However, currently, there is relatively low employment in the knowledge sectors, e.g. financial and international services.⁵⁰ Besides that, Ireland has recently seen closer ties of cooperation towards cluster structures in the areas such as medical devices, pharmaceuticals, ICT, biotechnology, tool making, food and seafood further intensifying in recent years. Tourism is a crucial sector for the economy. As regards to the latter, however, the challenge will be to achieving a greater spatial spread of the benefits of tourism.⁵¹

Main sea-related economic functions

The following chapter provides an overview on the main sea-related functions.

Food, nutrition, health and eco-system services

Fish, shellfish, seaweeds and other marine species are a recognized source of functional ingredients (i.e. health-promoting additives) that offer huge potential for Ireland's large food and ingredients companies to target the \$300bn global market for functional foods and ingredients. The Irish seafood sector has an estimated annual sales value of €700 million with a potential to increase revenue to €1 billion by 2020. Irish seafood exports increased by 14% in 2010 and 13% in 2011, to €420m. There is significant scope to expand Ireland's aquaculture industry, with increases expected from both conventional aquaculture and the new deep sea salmon farming initiative, amounting to 78% in volume of production by 2020. The seafood sector employs close to 11,000 people, primarily in peripheral coastal locations. With increased economic activity this is expected to reach 14,000 in 2020. Ireland's seaweed industry is worth approximately €18m per annum, processing 36,000 tonnes of seaweed (entirely from wild resources).

The Marine Institute fleet of research vessels, and the deep-sea remotely operated vehicle (ROV), are essential elements of a supporting infrastructure for bio-discovery. Significant national funding is supporting capacity building through a series of grants for Bio-discovery (€7.3m), Fish Population Genetics (€3.7m) and Marine Functional Foods (€5.2m) research. The Irish industry has already created novel products based on marine origin materials, including food flavour compounds (Cybercolloids Ltd) and human health supplements (Marigot Ltd).

Blue biotechnology

In recognition of the potential value of marine organisms as a source of next generation materials and processes for the animal and human health, biomaterials, pharmaceutical and nutraceuticals, and food sectors, Ireland is working towards the development of a Marine Biotechnology cluster. Within Ireland, it is particularly the seaweed that can draw on the marine biotechnology for supporting growth in high-value added products.⁵² Marine-derived drugs, enzymes and bio-materials (e.g. glues and bone replacement) are the subject of significant research and commercial interest. Irish companies target markets for animal health and horticultural products using compounds derived from native Irish seaweeds.

This is due to the fact that 1) the area on the West Coast harbours many sheltered bays and inlets and 2) reduced risk of pollution due to the absence of heavy industry and intensive farming. Further

⁵⁰ Regional Innovation Monitor, 2012: Regional Innovation Report (Border, Midlands and Western Region, Ireland), Final Report 12th April 2012: Page 45

⁵¹ http://www.iro.ie/bmw_assembly.html

⁵² Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 43

to that, the Atlantic swell flushes out the bays along these coastlines and adds to the existing stock of nutrients that act as feed for the seaweed plant.⁵³

Catching fish for human consumption and animal feeding

The seafood sector, including sea fisheries, aquaculture, seafood processing and added-value represents an important component of the Irish ocean economy with an annual sales value of €719 million and supporting 11,000 jobs. This, in spite of the fact that while Ireland is surrounded by some of the most productive fishing grounds in Europe, the Irish share of these fishing opportunities represent only 21% by tonnage and 17% by value.

The Food Harvest 2020 Report⁵⁴, published in July 2010 by the then Department of Agriculture, Fisheries and Food (DAFF), sets out a strategic blueprint for the development of the agriculture, food, fisheries and forestry sector and a vision to grow the seafood industry to €1 bn and employment to 14,000 by 2020 based on the premise of smart, value-added and green growth. In support of this, the NutraMara – Marine Functional Foods Initiative was established mobilising expertise in Teagasc (Agricultural Research Institute), the National University of Ireland, Galway, University College Dublin, University College Cork, University of Limerick and University of Ulster (cross-border partner).

With increasing energy costs, fishermen will have to travel more short distance to fish in the Atlantic Sea. In order to capitalise on the many harbours and to attract a greater proportion of EU landings the harbour infrastructure will be developed to increase landing and downstream activities at the Harbours. Therefore, in total € 203 m will be invested under the Fisheries and Coastal Infrastructure Sub-Programme to ensure the future viability of the fishing industry, notably to bring the Fishery Harbour Centres up to international practice, to reduce congestion at the harbours and to improve safety for the fisheries sector. The six Fishery Harbour Centres are spread along the coastline of Ireland: Howth, Dunmore East, Castletownbere, Ros-An-Mhil, Killybegs and An Daingean. In that context, and to increase sustainability, it will be necessary, in addition to attracting business from other fleets, to maximize the scope for diversification to marine leisure and other activities through the utilisation and development of our Coastal infrastructure. It will therefore be necessary during the Plan period to develop other industries such as aquaculture, tourism and the leisure industry to provide alternate means of employment for communities dependent on fishing. The development of port infrastructure and port service facilities will help to accommodate this.⁵⁵

Maritime transport and shipbuilding

Maritime shipping, ports and services are critical to Ireland. Sea-based transport accounted for 99% of the total volume (45 million tonnes) and 95% of the total value (€128 billion) of the goods traded (imports/exports) through Irish ports in 2010. There was a 40% increase in the numbers of firms operating in the international shipping services sector between 2006 -2010. In 2010, employment in this niche services sector in Ireland grew by 10%. Marine commerce and the provision of marine financial services is a growing sector - marine commerce had a turnover of €99.5 million in 2007.

In general, the Irish maritime transport sector has a two-fold portfolio: shipping firms, service providers and government agencies serve mainly the local market. A more recent and smaller international market, consisting of ship-owners and shipping service providers has emerged and

⁵³ <http://www.aramara.ie/about.asp>

⁵⁴ Food Harvest 2020 - A Vision for Irish agri-food and fisheries www.agriculture.gov.ie/agri-foodindustry/foodharvest2020/

⁵⁵ Department of Agriculture, Fisheries and Food, 2009: Development of Business Plans for the Fishery Harbour Centres: 16

provides international shipping services.⁵⁶ It is perceived that a more sustained and focussed strategy on creating a dedicated shipping service centre in Ireland could lead to growth in new employment. Drawing on Irelands existing policy framework for existing international shipping services, IMDO projects that 170 new jobs could emerge by 2015 in international shipping services in Ireland.⁵⁷

Leisure, working and living

Marine tourism and leisure is estimated to represent 7% of our overall tourism and leisure sector and contributed €453 million to the Irish economy in 2007. Over 200 cruise liners, carrying 205,000 passengers, visited Ireland in 2010, an increase of over 200% in the last decade. In recognition of this opportunity, Fáilte Ireland, are preparing a policy paper to provide insights and direction for their work in this area.

Yachting and marinas

Figure 3: Public spectators, Volvo Ocean Race Stopover in Galway 2009⁵⁸



With Dublin and Cork being the main ports of call for cruise liners, Galway is less of a beneficiary of cruise tourism.⁵⁹ Due to joint place marketing efforts, the area has seen recent economic growth thanks to positioning itself as location for international marine sports events. The 2009 Volvo Ocean Race stopover in Galway⁶⁰, which lasted two weeks, provides an interesting example of economic return and location branding

generated through integrated sports events: An accompanying programme of entertainment aimed at attracting a broad range of visitors and not just the sailing community. 70 concession units were included in the race village to make visitors increase their dwell time and spending. Eventually, the average spending per each international visitor resulted in €940 and final attendance amounted to 650,000 visitors with return of €55.8m to the Galway economy.⁶¹

An attempt to further develop the value chain for maritime sports events has been jointly undertaken by “Volvo Ocean Race Galway” and “Let’s do it Galway”. The local initiative is initiated by the Galway Chamber of Commerce who proactively approached parties in terms of the Volvo Ocean Race stop-over and encouraged them to jointly exploit the event in economic terms. Among other factors, this led to the setting up of the race village and the roll-out of joint local awareness raising and dissemination campaigns.⁶²

⁵⁶ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 10

⁵⁷ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 13

⁵⁸ <http://campus.ie/ents/music/galway-volvo-ocean-race-stopover> with copyright by Ronan Palliser

⁵⁹ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 32

⁶⁰ And which will be repeatedly organised in Galway between 30th June and 8th July 2012. More information: <http://www.galwayvolvoceanrace.com/>

⁶¹ Fáilte Ireland, 2009: Economic Impact & Media Report. Volvo Ocean Race 2008 – 2009. 23rd May to 6th June 2012: Page 6 and 14

⁶² According to qualitative interview with a representative from the local research community

Coastline tourism

The marine leisure and tourism industry has developed well in terms of infrastructural planning, investment and development.⁶³ This is linked to the overall national attempt to create clusters of linked maritime economic activities. Overall, the prospects for coastline tourism in Ireland are rather good, with nearly one third (27%) of domestic tourists engaged in watersports activities which accounts for the highest interest among all possible tourism activities.⁶⁴ Demand comes both from foreign tourists but equally so from indigenous ones: According to the national tourism board, nearly 75% of domestic activity holidays take place on the Irish Western seaboard and more than one third of such holidays are family holidays.⁶⁵ Nearly 1.2m holidaymakers (both domestic and foreign) engaged in water-based activities (2008) and the Irish market for leisure related to coastline was contributing € 453.3m in gross value to the Irish economy. In the same year, it employed 5800 people.⁶⁶

The development strategy is now succeeded by Failte Ireland's attempts to place greater emphasis on the development of adventure tourism products for which especially the Atlantic coastline is perceived to be particularly suited.⁶⁷ These products include walking and cycling, water sports and aspects of angling, for instance.

Besides that, the Irish national Tourism Development Authority (Failte Ireland) aims at expanding the growing market for adventure holidays in the future, particularly alongside its Atlantic shores. This relates to targeted investments in infrastructure, business support and promotion of active engagement and authentic adventure experience.⁶⁸

Energy and raw materials

The recent Strategy for Renewable Energy: 2012 – 2020, published by the Department of Communications, Energy and Natural Resources in 2012, stresses the central role of renewable energies for Ireland to decrease dependence on fossil fuels, improve security of supply, and reduce greenhouse gas emissions. The Strategy identifies a number of goals including:

- Strategic Goal 1: Progressively more renewable electricity from onshore and offshore wind power for the domestic and export markets;
- Strategic Goal 3: Green growth through research and development of renewable technologies including the preparation for market of ocean technologies.

In support of this, and earlier work by Sustainable Energy Ireland (SEI) and the Marine Institute (2005)⁶⁹ significant investments has been made in research capacity and infrastructures, e.g. Wave Energy Test Tank Facilities at UCC, Pilot Wave Energy Test Site Spiddal, Galway and plans for a full scale Wave Energy Test site off Belmullet, Co Mayo.⁷⁰ Hence, the marine renewable energy sector saw an increase of activity from €18 million in 2003 to €101 million in 2007. In 2007, eight companies were actively involved in the design, development, testing and deployment of marine renewable energy devices.

⁶³ The Socio-Economic Marine Research Unit (SEMRU), 2011: A socio-economic study of marine-based water activities in the west of Ireland, Working Paper 11-WP-SEMRU-01: Page 1

⁶⁴ Failte Ireland, 2009: Tourism Facts 2009 : Page 9

⁶⁵ The Socio-Economic Marine Research Unit (SEMRU), 2011: A socio-economic study of marine-based water activities in the west of Ireland, Working Paper 11-WP-SEMRU-01: Page 8

⁶⁶ Morrissey K., Hynes S., Cuddy M., O'Donoghue C.2010: Ireland's Ocean Economy 2007, Socio Economic Marine Research Unit, National University of Ireland, Galway.

⁶⁷ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 37

⁶⁸ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 32

⁶⁹ Ocean Energy in Ireland: An Ocean Strategy for Ireland (2005). Department of Communications, Marine and Natural Resources .

⁷⁰ This is supplemented by the establishment of an Ocean Energy Development Unit (OEDU) as part of Sustainable Energy Authority Ireland (SEAI) and the setting up of an Irish Marine Renewables Industry Association (MRIA)

Offshore Wind

Ireland's offshore wind, waves and tides have the potential to offer a source of clean, green, renewable energy along with exciting new commercial opportunities (services), provided the technologies become commercially viable.⁷¹ Within the national Offshore Renewable Energy Plan (OREDPlan),⁷² a number of assessment areas are identified which focus on the main geographical areas of resources identified for offshore wind (fixed and floating) and ocean renewable energy (wave and tidal energy).⁷³ Besides, it identifies where economic development is most likely to occur, including potential environmental constraints and assess the levels of future development.⁷⁴ The following results on the offshore renewable resources of the Irish Atlantic coast can be recorded for the Atlantic coastline:

Table 2: Assessment of the Irish coasts' potential in terms of offshore renewable resources

	Ocean Renewable		Ocean Energy			Total (MW)
	Fixed Wind (in MW)	Floating Wind (MW)	Wave shallow water (0 to 100m of water depth) (in MW)	Wave deeper water (100m to 200m of water depth) (in MW)	Tidal (MW)	
East Coast (North)	1200 to 1500					1200 to 1500
East Coast (South)	3000 to 3300				750 to 1500	3750 to 4800
South Coast	1500 to 1800	6000				7500 to 7800
West Coast (North)	3000 to 4500	7000 to 8000	7000 to 8000	6000 to 7000	750 to 1000	23750 to 29000
West Coast (Centre)	500	7000	5000	6000 to 7000	-	18500 to 19500
West Coast (South)	600 to 900	5000 to 6000	500 to 600	3000 to 3500	-	9100 to 11000
Total	9,800 to 12,500	25,000 to 27,000	12,500 to 13,600	15,000 to 17,500	1,500 to 3,000	

Source: *Our Ocean Wealth, towards and Integrated Marine Plan for Ireland, Part II Sectoral Briefs: 17; adapted by Ecorys*

The reasons for current constraints on the development of offshore wind along the Irish coast (centre, but also southern coastline) are insufficient water depth, as well as shipping and navigation problems particularly in bays and close to the shore. The availability of onshore grid connections and overall grid capacity play an impediment in the further development of both the ocean energy and renewable energy sector.⁷⁵

⁷¹ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 16

⁷² Compiled by the Department of Communications, Energy and Natural Resources with input from South-East Development Agency and

⁷³ Strategic Environmental Assessment (SEA) of the Offshore Renewable Energy Development Plan (OREDPlan) in the Republic of Ireland, 2010. Environmental Report, Volume 2. Main Report. October 2010

⁷⁴ Strategic Environmental Assessment (SEA) of the Offshore Renewable Energy Development Plan (OREDPlan) in the Republic of Ireland, 2010. Environmental Report, Volume 2. Main Report. October 2010: 17

⁷⁵ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 18 and also confirmed by some interviewees

Ocean Energy

In terms of ocean energy, in particular wave energy, the country has great growth potential (see table 2 and below description of Smart Bay Galway and Quarter Scale Wave energy test site). In particular for wave energy, the results indicate a potential for both shallow and deeper water in Ireland, albeit much higher potential further out on the sea. In comparison to that, the potential for tidal energy is much more constrained. This is partially also related to potential environmental trade-offs associated with tidal energy due to its rather close proximity to the shore – compared to wave energy.⁷⁶ Substantial potential can also be recorded for floating wind, and to a much lesser degree to fixed wind.

The ocean energy programme⁷⁷ has made Ireland move some significant steps with companies, such as Wavebob, Ocean Energy and Open Hydro.⁷⁸ The Irish economy is assembling other key elements of the ocean energy, i.e. utility project developers and other companies working in the supply chain activities. The market potential on a national basis is up to 30,000 jobs on a 2030 horizon.⁷⁹ Besides, an estimated €1bn per annum in earning potential by 2020 is expected.⁸⁰ Existing of a rather indigenous industry structure, the wave and tidal energy industry is an indigenous industry, and consists of a group of knowledge-based and innovative companies which focus mainly on the pre-commercial design stage.⁸¹ In the country, there is a considerable resource with electricity generation and existing strengths in ocean energy research and developments due to the University of Galway, the Irish Marine Institute's office and other industry players.⁸² Joint collaboration in the form of public-private partnerships with industry partners, e.g. Vattenfall, has been undertaken to also cover the whole environmental aspects of the test site.⁸³

Offshore Oil & Gas

Ireland's offshore Atlantic margin is estimated to hold substantial 'potential, yet-to-find' hydrocarbon reserves of some 10 billion barrels of oil equivalent (including gas). Alongside the Irish coastline, different degrees of accessibility of the oil and gas fields, e.g. the Kish Bank off Dublin Bay in relatively shallow water compared to the Doosh discovery at a depth of 1500 metres.⁸⁴ This leads to high differences in costs for exploitation. Seen that all exploration activities and costs fall under the same tax break, this leads to potential tensions between the exploiting companies. Total investment to-date by the private sector in exploration activity is estimated at approximately €3 billion, resulting in four commercial discoveries (three off Cork and the Corrib Field, off Mayo).⁸⁵ 13 other discoveries in the Irish offshore are currently under assessment.⁸⁶ Production in the Corrib Field has currently been intensified. In terms of market potential, the costs of exploring are comparably high on the Irish Atlantic coast which may impose certain constraints to the future development. This is mainly related to its remoteness and water depths (7 to 8 times deeper than in the North Sea). Further constraints of the Atlantic coastline are the absence of large-scale

⁷⁶ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 18

⁷⁷ The overall Ocean energy programme benefits from a financial envelope of € 26m, which includes €2m to support the development of grid-connected wave energy test site (notably the Quarter Scale Wave Energy Test site in Galway bay) and grants under the Ocean Energy Prototype Fund which will help developers in the commercialisation of their devices.

⁷⁸ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 15

⁷⁹ Hence, this allows only approximations for the development of employment in Galway County. Seen the existing strong infrastructure and the Ocean Energy Test Site located in Galway Bay, implications for the county can be estimated to be significant.

⁸⁰ Own estimates of Ocean Energy Ireland – available under: <http://www.oceanenergy.ie/markets/irish.html>

⁸¹ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 16

⁸² According to qualitative interview with a representative from the energy authority

⁸³ <http://www.vattenfall.com/en/ocean-energy.htm> and also according to the qualitative interviews

⁸⁴ SIPTU, 2011: Optimising Ireland's Oil & Gas Resources. Report of the SIPTU Oil & Gas Review Group: 15-16

⁸⁵ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 26

⁸⁶ SIPTU, 2011: Optimising Ireland's Oil & Gas Resources. Report of the SIPTU Oil & Gas Review Group: 5

infrastructure provision, e.g. pipelines and platforms, which makes exploration and exploitation more expensive, hence less lucrative.⁸⁷ Natural resources of offshore gas along Galway shores are rather limited.⁸⁸ Other promising and commercially viable offshore oil resources have been recently discovered at the Barryroe field off County Cork on the South East coast.⁸⁹

Besides offshore oil, there has also been a significant onshore discovery of natural gas in the North West Carboniferous and Clare basins which cover an area of approximately 8000 sqkm in parts of south Donegal, Cavan, Leitrim, Sligo, Mayo, Monaghan, Roscommon, Fermanagh, Clare, Cork, Kerry and Limerick.⁹⁰

Maritime Monitoring and Surveillance

With its strong ICT base, a number of companies active in developing sensors and other monitoring devices and cooperation initiatives like SmartBay and SmartOCEAN, maritime Monitoring and Surveillance is a particularly strong sector in Ireland. Initiated as a national research infrastructure project,⁹¹ SmartBay is a national research infrastructure project which comprises a network of buoys, seafloor cables and other infrastructure that are supporting a range of sensors and information systems. The objective of the project is to develop the basis for real time oceanographic monitoring.⁹²

In addition to that, at several places test sites are developed, such as the Quarter Scale Wave Energy Test Site⁹³ in Galway Bay, which is providing real time monitoring of data from a wave riders (directional) and metocean buoys. This and other test sites are primarily used by indigenous SMEs, and are supported by larger IT firms like Intel, IBM or Microsoft. Among the companies, both WaveBob Ltd. and Ocean Energy Ltd. have used these test sites for developing wave devices.⁹⁴

Marine ICT devices as horizontal marine economic activity

Over 50 ICT companies (SMEs and multinationals) are involved in the Irish SmartOcean cluster, targeting the fast-growing market for marine ICT products and services for the oil and gas, renewable ocean energy, and transport and shipping sectors and for environmental monitoring and maritime security and surveillance.

Within marine ICT in Ireland, technology convergence and integration is a key theme encompassing tools for application in marine businesses.⁹⁵ Indigenous SMEs⁹⁶ are located in close proximity to the Wave Energy Test Site. The latter is offering a range of additional opportunities for small and medium-sized device developers. It aims at bridging the gap between research and the industry by facilitating the market uptake of marine products and services developed in the laboratory.⁹⁷ Thematically, it is designed to support the development of next generation monitoring and data solutions for a range of global markets including offshore energy, security and shipping.

⁸⁷ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 28

⁸⁸ According to an interviewee

⁸⁹ This offshore field has recently been discovered (March 2012): <http://irishoilandgas.wordpress.com/>

⁹⁰ SIPTU, 2011: Optimising Ireland's Oil & Gas Resources. Report of the SIPTU Oil & Gas Review Group: 5

⁹¹ SmartBay brochure, Page 1: the project was established by the Irish Marine Institute and the Environmental Protection Agency Ireland in 2007. More information on: <http://www.marine.ie/home/services/operational/SmartBay/SmartBay.htm>

⁹² <http://www.marine.ie/home/services/operational/SmartBay/SmartBay.htm>

⁹³ More information available at: http://www.fp7-marinet.eu/SEAI_OEDU-wave-energy-test-site-galway-bay.html (last accessed 2nd May 2012)

⁹⁴ <http://www.marine.ie/home/aboutus/organisationstaff/researchfacilities/Ocean+Energy+Test+Site.htm>

⁹⁵ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 38

⁹⁶ Perceived to be rather specialised and research intensive across Ireland,

⁹⁷ Which is the Irish national facility for marine ICT

3.4 Synergies and tensions

Synergies addressed

In Ireland, considerable synergies exist between recreational tourism, marine tourism industries as well as related retail industries, restaurants and hotels.

Further synergies between offshore and onshore sectors are being addressed through initiatives such as SmartOCEAN and the recent workshop where SMEs active in various sectors including land-based applications were given the floor to seek partnerships across maritime sectors.

Through the interventions of the Marine Institute and its cluster initiatives, synergies with the meteorological sector are being developed, for instance through using test sites for providing information on meteorological conditions through its sensors. Buoys serve as a platform to test various components required by the ocean energy industry, e.g. power generators, power control systems, instrumentation to telemetry and a grid interface technology.⁹⁸ Further to that it provides potential for synergies with food, nutrition, health and eco-system services, notably fish, for which the site provides tools for acoustic monitoring of cetaceans.⁹⁹ Apart from that, synergies exist with services, i.e. local technical services such as boat hire, yard space and engineering works.

Synergies identified but not yet addressed

Marine Biotechnology draws on very diverse marine ecosystems on the coasts of Ireland which have potential in food, proteomics and biomaterials. Strong synergies exist between marine biotechnology and the production of biopharma. Other synergies with other sectors are the medical devices industry, which produces generic tools and instruments to better exploit the potential of marine biotechnology.¹⁰⁰

Ocean energy demonstration facilities involve companies in early stage projects, i.e. engineering, service, shipping companies. Hence, strong synergies exist with the broader engineering ports and shipping sector. In that respect, the synergies are strong between sea and land-based marine economic activities, i.e. engineering (onshore) and wave/tidal (offshore). Besides, ocean energy has synergies for the fishing sector from a marine spatial point of view. Effectively, marine energy is the largest new user of marine space, since fishing and shipping emerged as economic sectors.

Tensions

One particular tension between ocean energy and offshore wind is the development of the offshore grid. The extension of the offshore grid system¹⁰¹ may hamper the development of the emerging ocean energy sector due to construction works and other factors. Another offshore to offshore tension is the issue of large-throughput electricity transmission cables. The latter relates to attempts to bypass the mainland onshore grid and transmit electricity directly to other countries via offshore based points of key electricity transmission capacity. This could create tensions with efforts to extend the onshore (mainland) grid.

The utilisation of offshore sea space, by renewable energy and ocean energy creates tensions with other marine economic activities, in particular with marine aquaculture and cruise tourism. The reason being that these rather traditional maritime economic sectors feel increasingly pressured by

⁹⁸ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 20

⁹⁹ Our Ocean Wealth, Towards an Integrated Marine Plan for Ireland. Part II Sectoral Briefs: 20

¹⁰⁰ According to qualitative interview with a representative from the energy authority

¹⁰¹ which is currently supported by various EU projects, e.g. the ISLES project <http://www.islesproject.eu/>. ISLES is an INTERREG Iva co-funded project with the participation of the Northern Ireland Executive, the Scottish Government and the Government of Ireland

emerging sectors to cede their marine space.¹⁰² To overcome the restrictions to fisheries by ongoing and future marine energy projects, actors have to work together to explore potentials for mutual support of each other and define a spatial planning framework that benefits both.

The potential excess capacity of fisheries will have a negative impact on local employment level, since local fishermen can not immediately turn to new employment due to their existing skill set.¹⁰³ There have been tensions between fish farms, i.e. between recreational fishermen and salmon fish farms. The first were claiming that the salmon fish farming would have a negative impact on fish stock. Due to the decreasing sales of fish of salmon farms due to decreasing price for salmon, diseases, and issues of proximity to the shores of these fish farms, the issues has recently been dissolved.

Besides, tensions exist between the real estate market on the coastline and economic actors advocating for coastal protection. In a particular case, the impact of badly constructed sewage created tensions between local residents and the – at that time booming – housing construction companies and real estate agencies.

In general and in relation to offshore oil & gas, major controversial conflicts have lead to tensions. The example of the Corrib oil & gas field in Mayo County, which is exploited by Shell illustrates that commercial exploitation plans and discovery techniques were leading to deteriorated relationships with coastal communities.

3.5 Main stakeholders

Irish Marine Institute

The Marine Institute is a national agency responsible for Marine Research, Technology Development and Innovation (RTDI) with its headquarters in Galway. Set-up in 1991, its mission is to undertake and co-ordinate marine research and development that will promote economic development and create employment and protect the marine environment.¹⁰⁴ Beyond that, it also acts on a political level by entertaining close links with the National Ministries, in particular the department for Agriculture, Food and the Marine, Communications, Energy and Natural Resources and Transport, Tourism and Sports. On an international level, it supports the government of Ireland in shaping the Irish and EU maritime agenda.¹⁰⁵

National University of Galway (NUIG)

University of Galway's Ryan Institute, based on leads marine biodiscovery, marine functional food and aquaculture programmes. It links up with other Institutes in the country. Through its dedicated research station¹⁰⁶ it provides a practical platform for bioresource research, notably on exploratory aquatic investigations, as well as research on novel species for aquaculture.¹⁰⁷ Researchers at NUI Galway's Ryan Institute are at the centre of conservation efforts in relation to deep-sea mining for precious minerals. The ecological assessment of the effects of mining operations will be key to sustainable exploiting resources at these important habitats.¹⁰⁸ The *Galway-Mayo Institute of Technology (GMIT)* is involved in a range of research activities collaborations with other higher

¹⁰² According to qualitative interview with a representative from the energy authority

¹⁰³ According to qualitative

¹⁰⁴ <http://www.marine.ie/home/aboutus/>

¹⁰⁵ Not least shown by the participation to the Expert Hearing Blue Growth on behalf of DG MARE in November 2011 in Brussels or active participation of the CEO as panel speaker at the European Maritime Days 2012 in Gothenburg, to mention a few examples

¹⁰⁶ Carna Research Station

¹⁰⁷ <http://www.ryaninstitute.ie/facilities/carna-research-station/>

¹⁰⁸ <http://www.marinetimes.ie/> accessed on 22nd May 2012

education centres and industry.¹⁰⁹ By offering trainings and academic courses on marine sectors, it adds to the available skill set in the region and Ireland.

Marine Socio-Economic Research Unit (SEMRU)

Part of the National University of Galway, this unit focuses on the economic importance of coastal and off-shore marine environments. This involves examining the economic utility of the marine environment (e.g. transportation, recreation) and ecological value (e.g. fisheries, aquaculture) derived from the productivity of associated ecosystems. Among the unit's projects are the collection and monitoring of socio-economic marine data for Ireland, the estimation of participation rates and value of marine-related recreation activities, an analysis of market orientation, competitiveness and innovation of firms in the Irish seafood sector, and many other research activities.¹¹⁰

University College Cork (UCC)

The university has over 17,000 students and 710 research staff. The university is one of Ireland's leading research institutes, with the highest research income in the state. Among the thematic research pillars related to maritime economic activities are 1) Food and Health with the NutraMara, 2) the Food for Health Ireland Research Centre, and Cereal Science Cork, 3) and the Environmental Research Institute (with research in aquaculture, energy efficiency and ocean energy to mention but a few).¹¹¹ Besides its research activities, UCC is also involved in the iMerc Cluster Cork (see also 1.6. beneath).

The college hosts the Hydraulics and Maritime Research Centre (HMRC)¹¹² which is a centre of excellence within Ireland for Ocean Renewables and Coastal Engineering providing support to the maritime industry as well as fundamental R&D, next to a teaching and education function. It contributes to the development of the Irish ocean energy sector through its wave simulation facilities, e.g. with a Wave Flume and Ocean Wave Basin. A number of business cooperations are pursued across the country, notably the Wave Energy Ireland as a combined wind and wave project. Limerick Wave for which the centre did a significant amount of testing on this device. Geowave - Research for Benefit of SMEs. Equally so, mooring and foundation testing was conducted within geotechnical design solutions for the offshore renewable wave energy industry. MaRINET -Marine Renewables Infrastructure Network for Energy Technologies- is an FP7 Infrastructures Project (€9m project value, 2011 – 2015) to network European wide Marine Renewables Test and development infrastructure. Further to that, it supports developers and researchers to test facilities all over Europe at all scales from concept through to full scale.

Trinity College Dublin

The marine science group at Trinity College Dublin focuses currently on bioindicators of physiological, environmental and pollution effects on marine organisms and systems, sustainable use of resources including fisheries, biodiversity, productivity and other natural goods and services of estuarine and coastal systems as well as effects of climate change on marine systems and invasive species.¹¹³

Maritime multinational corporations, e.g. IBM Ireland, Open Hydro

Large corporations, such as OpenHydro based in Dublin provide the maritime sectors with the technology to deploy their sectors. The core business of Open Hydro is the manufacture and

¹⁰⁹ <http://www.gmit.ie/presidents-office/about-gmit/>

¹¹⁰ <http://www.nuigalway.ie/semru/>

¹¹¹ <http://www.ucc.ie/>

¹¹² http://www.ucc.ie/en/hmrc/forum/third_forum/speakers/

¹¹³ <http://www.tcd.ie/Zoology/research/research/MarineandEstuarine/index.php>

installation of tidal energy systems to supply the renewable energy.¹¹⁴ Further to that, IBM is largely involved in maritime monitoring and surveillance. The new IBM Water Management Centre, based in Dublin focuses on innovative research and services in monitoring and management of fresh water, marine and oceanic environments.¹¹⁵ In collaboration with the Irish Marine Institute via the SmartBay platform, the company has developed a project showcasing the commercial potential of sensor intelligence for generating new intelligence.¹¹⁶

Local and regional SMEs

These companies are particularly relevant for the ocean energy sector. A broad indigenous industry of knowledge-based and innovative companies are covering the pre-commercial design stage of wave and tidal energy devices. Beyond that, in the coastline tourism and yachting, SMEs are important players. Other companies include Wavebob, a leading wave energy technology company which harnesses the power of ocean energy. Equally so MCS Kenny, for instance, which is providing engineering services to the offshore oil & gas industry.¹¹⁷

3.6 Governance and integrated policy responses (3 pages)

The Republic of Ireland has a relatively centralised administration. Responsibility of ocean governance is spread across a number of Government Departments (Ministries) though is increasingly focussed on the Dept of Agriculture, Food and the Marine. An Inter-Department Marine Co-Ordination Group, chaired by the Minister for Agriculture, Food and the Marine and hosted by the Department of An Taoiseach (Prime Minister) was established in 2009 to better co-ordinate policies and strategies related to the sustainable development of marine resources, including the Integrated Maritime Policy for the European Union (2007), the Marine Strategy Framework Directive (2008) and the European Union Strategy for the Atlantic (2011).

There are 34 Local Authorities in Ireland, including 29 County Councils and 5 City Councils. At a regional level, 8 Regional Authorities (NUTS III) co-ordinate certain activities of the Local Authorities and play a monitoring role in relation to the use of EU Structural Funds.

The country is further designated into two NUTS II Regions, with two Regional Assemblies (BMW: Border, Midlands and Western Regional Authority; S&E: Southern and Eastern Regional Assembly) being responsible for managing the Objective 2 Regional Competitiveness & Employment programmes. These regionalisation arrangements were negotiated by the Irish Government in the context of Lisbon Agenda (2000) for the 2000-2006 Structural Funding period. The NUTS status of these Regions is currently under review as part of the preparations for the next Multi-annual Financial Framework (2014-2020).

Paralleling the development of the EU Green Paper: Towards a future Maritime Policy for the European Union: A European Vision for the Seas and Oceans (2006) and the subsequent Integrated Maritime Policy for the European Union (2007), between 2005-2006, a Foresight Initiative¹¹⁸ was undertaken to assist the existing and largely indigenous Irish marine sub-sectors to improve their overall competitiveness and to identify new knowledge-based opportunities based on

¹¹⁴ <http://www.openhydro.com/home.html>

¹¹⁵ <http://www.marine.ie/home/aboutus/newsroom/pressreleases/SmartBay+project+to+be+supported+by+New+IBM+Water+Management+Centre.htm>

¹¹⁶ SmartOcean Ireland, 2010: Harnessing Ireland's Potential as a European and Global Centre for Ocean Technologies: Page 3

¹¹⁷ For a more extensive list of companies active in maritime economic activities, please see SmartOcean Ireland, 2010: Harnessing Ireland's Potential as a European and Global Centre for Ocean Technologies, Pages 28-32

¹¹⁸ Marine Institute (2006) Sea Change (2007-2013) Part II: Marine Foresight Exercise for Ireland. 202pp.

the development of marine resources. This foresight exercise resulted in the Sea Change Strategy: A Marine Knowledge, Research & Innovation Strategy for Ireland: 2007-2013¹¹⁹.

The foresight study highlighted a number of areas for development and identified the need to strengthen and/or develop research, technology, development and innovation capacity, specialist infrastructures (e.g. wave energy test and demonstration facilities) and services (e.g. seabed mapping) to support this development. Amongst the areas highlighted for development were:

- Seafood: Production – Processing – Added Value;
- Renewable Ocean Energy;
- Emerging Technologies- Advanced Marine Technologies (e.g. sensors) and Marine Biotechnology;
- Maritime Ports and Shipping.

National research funds from the national Strategy for Science, Technology and Innovation (SSTI) Programme were used to develop new capacity in identified gap areas, including in:

- Ecosystem Approach To Fisheries/Environmental Management;
- Marine Economic and Social Research;
- Marine Sensors and Communications Marion Biodiscovery/Biotechnology;
- Fish Population Genetics;
- Renewable Ocean Energy;
- Marine Functional Foods;

Ireland is an **Innovation follower** with an above average performance. Relative strengths are in human resources, open, excellent and attractive research systems and economic effects. Relative weaknesses are in finance and support, linkages & entrepreneurship, intellectual assets and innovators.

Innovation Union Score Board 2011

Investments were made primarily in human capacity building, mobilising existing resources and investments and encouraging inter-disciplinary and inter-institutional co-operation and North-South collaboration.

Areas of particular attention included:

Renewable Ocean Energy: Ireland's coastline, inshore and offshore waters are amongst the richest and most accessible renewable energy (wind, wave and tidal) resources in the world. This and the opportunities presented are reflected in the recent **Strategy for Renewable Energy: 2012 – 2020**. Published by the Department of Communications, Energy and Natural Resources in 2012, the strategy argues that the development of renewable energy is central to overall energy policy in Ireland. Renewable energy reduces dependence on fossil fuels, improves security of supply, and reduces greenhouse gas emissions creating environmental benefits while delivering green jobs to the economy, thus contributing to national competitiveness and the jobs and growth agenda.

The Strategy identifies a number of goals including:

- Strategic Goal 1: Progressively more renewable electricity from onshore and offshore wind power for the domestic and export markets;
- Strategic Goal 3: Green growth through research and development of renewable technologies including the preparation for market of ocean technologies.

In support of this Strategy, and earlier work by Sustainable Energy Ireland (SEI) and the Marine Institute (2005)¹²⁰, significant investments has been made in research capacity and infrastructures,

¹¹⁹ Marine Institute (2006) *Sea Change A Marine Knowledge, Research & Innovation Strategy for Ireland: 2007-2013*. 138pp.

e.g. Wave Energy Test Tank Facilities at UCC, Pilot Wave Energy Test Site Spiddal, Galway and plans for a full scale Wave Energy Test site off Belmullet, Co Mayo. This is supplemented by the establishment of an Ocean Energy Development Unit (OEDU) as part of Sustainable Energy Authority of Ireland (SEAI) and the setting up of an Irish Marine Renewables Industry Association (MRIA).

Seafood: The seafood sector, including sea fisheries, aquaculture, seafood processing and added-value represents an important component of the Irish ocean economy with an annual sales value of €719 million and supporting 11,000 jobs. This, in spite of the fact that while Ireland is surrounded by some of the most productive fishing grounds in Europe, the Irish share of these fishing opportunities represent only 21% by tonnage and 17% by value. **The Food Harvest 2020 Report**¹²¹, published in July 2010 by the then Department of Agriculture, Fisheries and Food (DAFF), sets out a strategic blueprint for the development of the agriculture, food, fisheries and forestry sector and a vision to grow the seafood industry to €1 billion and employment to 14,000 by 2020 based on the premise of smart, value-added and green growth. In support of this, the **NutraMara – Marine Functional Foods Initiative** was established mobilising expertise in Teagasc (Agricultural Research Institute), the National University of Ireland, Galway, University College Dublin, University College Cork, University of Limerick and University of Ulster (cross-border partner).

Smart Oceans: Recognising the opportunity for new knowledge, emerging technologies and innovation to bring new opportunities to (a) further develop traditional marine sub-sectors (e.g. fishing, aquaculture, seaweed, shipping, tourism, oil and gas) and (b) to create new opportunities and sectors such as advanced technology, renewable ocean energy, marine biotechnology, etc., the Marine Institute's Marine Technology Programme has established:

The SmartBAY Facility: SmartBAY Galway is a national research infrastructure comprising of a network of buoys, seafloor cables and other infrastructure, supporting a range of sensors, information systems, telemetry and other communication technologies. SmartBAY provides a focal point for academic-industry co-operation in advanced marine technology and ICT systems, in-situ, real time oceanographic monitoring, and test and demonstration facilities for marine industries.

The SMARTOCEAN Cluster: Launched in 2010, the SMARTOCEAN Strategy (ICT for the Sea) seeks to harness Ireland's natural marine resources and specialist expertise in marine science and ICT to establish Ireland as a leader in the development of high value products and services for the global marine sector¹²². This includes the delivery of next generation technology products and services for marine sectors including aquaculture, environmental monitoring, shipping and security and marine renewable energy. Supporting the implementation of the SMART OCEAN Strategy is the SMARTOCEAN Cluster, a national co-operative platform of research centres, academic institutes, Multinational Enterprises (MNEs) and indigenous Small to Medium sized Enterprises (SMEs). These facilitate the provision of remote sensing systems, data management and visualisation tools, modelling, simulation, forecasting and engineering design supporting operational management. A number of companies have also developed products and services based on patented research from National Centres of Research Excellence.

¹²⁰ Ocean Energy in Ireland: An Ocean Strategy for Ireland (2005). Department of Communications, Marine and Natural Resources .

¹²¹ Food Harvest 2020 - A Vision for Irish agri-food and fisheries www.agriculture.gov.ie/agri-foodindustry/foodharvest2020/

¹²² SMARTOCEAN Ireland – Harnessing Ireland's Potential as a European and Global Centre for Ocean Technologies. Marine Institute (2011)

Marine Biotechnology: In recognition of the potential value of marine organisms as a source of next generation materials and processes for the animal and human health, biomaterials, pharmaceutical and nutraceuticals, and food sectors, Ireland is working towards the development of a Marine Biotechnology cluster. Ireland has a foundation of research and industry activity on which to build such a cluster. The Marine Institute fleet of research vessels, and the deep-sea remotely operated vehicle (ROV), are essential elements of a supporting infrastructure for biodiscovery. Significant national funding is supporting capacity building through a series of grants for Biodiscovery (€7.3m), Fish Population Genetics (€3.7m) and Marine Functional Foods (€5.2m) research. Irish researchers also participate in a number of EU funded projects in marine biomass production. Irish industry has already created novel products based on marine origin materials, including food flavour compounds (Cybercolloids Ltd) and human health supplements (Marigot Ltd).

iMERC – The Irish Maritime and Energy Resource Cluster¹²³

iMERC is an innovation cluster established by University College Cork, the National Maritime College of Ireland (NMCI) and the Navel Service. Whilst in once sense iMERC is a Regional Cluster, centred on the new research and enterprise campus at Ringaskiddy, Cork, it has a national and international focus, promoting island wide co-operation and industry support in the areas of marine energy (marine renewable and offshore hydrocarbons), maritime ICT, shipping logistics and transport, maritime security and safety and marine recreation.

The extended maritime campus under development at Ringaskiddy, Cork Harbour, builds on infrastructure already in place with the National Maritime College of Ireland and the Irish Naval Service Headquarters and Dockyard and plans by University College Cork to construct the Beaufort Laboratory on an adjacent site. Upon completion in Autumn 2013, this will be one of the world's largest marine renewable energy research facilities, supporting a trajectory of growth in development of a sector that could yield up to 52,000 jobs from wave energy for Ireland by 2030. Industry suites will be incorporated for the growing number of commercial enterprises attracted to the location, and the spin out companies that are beginning to emerge.

In June 2012, iMERC received a Public Service Excellence Award as one of 20 projects that were singled out for demonstrating innovation and excellence across the full breadth of State services.

Harnessing Our Ocean Wealth: *New Ways – New Approaches – New Thinking*

In 2011, the Irish Government, in recognition of the underutilisation of Ireland's ocean economy, initiated a public consultation "**Our Ocean Wealth: Towards Integrated Marine Plan for Ireland**" with a view to:

- providing a new momentum for growth in the marine area;
- ensuring government Departments worked together more efficiently and effectively on the diverse issues related to the marine,
- responding to EU marine/maritime initiatives such as the Integrated Maritime Policy for the European Union (2007), the Marine Strategy Framework Directive (2008) and the European Union Strategy for the Atlantic (2011).

The first step in developing an integrated marine plan was through the public consultation exercise (February – March 2012) which sought to gather the widest possible source of ideas and opinions to better inform the process¹²⁴.

¹²³ <http://www.imerc.ie>

¹²⁴ Our Ocean Wealth – Towards an Integrated Marine Plan for Ireland. Irish Government (2012).

The Inter-Department Marine Co-Ordination Group is currently reviewing the input (over 190 submissions) received through the public consultation exercise. A new Report, **Harnessing Our Ocean Wealth: an Integrated Marine Plan for Ireland**, is now in preparation. This Report will outline the actions that will deliver An Integrated Marine Plan for Ireland. It will set out the Government's **Vision** and **High-level Goals**, and the **Key Actions** to be taken to put in place the appropriate policy, governance and business climate to enable Ireland's marine potential to be realised. It will define a roadmap for Ireland's ocean economy that will ultimately lead to an integrated marine plan for Ireland, in line with best international practice, and in keeping with Europe's approach to an integrated maritime policy.

Other policy responses that have been implemented to develop synergies

The Irish Marine Institute has been involved in a number of strategic initiatives to develop synergies between sectors. In the paper "Sea Change: A Marine Knowledge Research and Innovation Strategy for Ireland 2007-2013", the Irish Marine Institute has structured the programme, undertaken detailed foresight analysis. As coordinator for Sea Change, it organized stakeholder groups that reflected areas of tensions, synergies, policy departments and national heritage.¹²⁵

On a more operational level, it hosts many national initiatives on its premises, e.g. the national programme Marine Biotechnology Ireland, which is led by the Irish Marine Institute in collaboration with NUI Galway.¹²⁶ This dedicated national programme has the objective to 1) promote the opportunity that marine biotech presents for development of Ireland, 2) simulate the interaction between industry and research, understanding the landscape, the industrial needs, technological bottlenecks, allowing these actors to talk and engage towards collaborative projects.¹²⁷ Funding is put forward and allows for feasibility study and pilot projects. Large collaborative products, the effort so far has been in funding the research. The programme has successfully enabled Irish maritime stakeholders to participate in EU funded projects. An example among others is the INTERREG co-funded project SHArEbiotech.net.¹²⁸ The project aims at connecting the research actors in the field of biotechnology in Ireland.

Finally, the SmartOcean (ICT for the Sea) initiative seeks to establish a network of specialist research institutes, innovative SMEs and multinational companies in the SmartCoast, SmartCatchment and SmartBay projects – and funded by the Irish Marine Institute and EPA.¹²⁹ The national leadership was launched in 2010 to develop synergies around ICT devices for maritime economic activities¹³⁰. This includes the delivery of next generation technology products and services for marine sectors including aquaculture, environmental monitoring, shipping and security and marine renewable energy. The SMARTOCEAN Cluster is supporting the strategy through a national co-operative platform of research centres, academic institutes, Multinational Enterprises (MNEs) and indigenous Small to Medium sized Enterprises (SMEs). These facilitate the provision of remote sensing systems, data management and visualisation tools, modelling, simulation, forecasting and engineering design supporting operational management. Ireland's Offshore Renewable Energy Development Plan (OREDPA) which describes the policy context for development of offshore wind, wave and tidal stream energy in Irish waters for the

¹²⁵ According to an interviewee from the Irish Marine Institute

¹²⁶ The marine biotechnology programme is part of the Marine, Knowledge, Research and Innovation Strategy 2007 – 2013 ("Sea Change")

¹²⁷ <http://www.marine.ie/home/research/SeaChange/NationalMarineBiotechnology/>

¹²⁸ <http://www.sharebiotech.net/case-studies>

¹²⁹ Marine Institute Ireland, 2010: SmartOcean Ireland – Harnessing Ireland's Potential as a European and Global Centre for Ocean Technologies: 3

¹³⁰ SMARTOCEAN Ireland – Harnessing Ireland's Potential as a European and Global Centre for Ocean Technologies. Marine Institute (2011)

period to 2030. It has been commissioned by the SEAI (Sustainable Energy Authority Ireland) in collaboration with the Irish Marine Institute.¹³¹

The National Renewable Energy Action Plan (NREAP),¹³² submitted in July 2010 to the European Commission and for which Ireland included a “non-modelled renewable electricity export scenario.”

At a national level, the ocean energy agenda was given a specific programme (National Ocean Energy Strategy) and mechanisms, i.e. an Ocean Energy Development programme. The latter comprises environmental planning, developing awareness and mobilising the supply chains of the other adjacent sectors, such as marine renewable, for instance.¹³³

The White Paper: “Delivering a sustainable Energy Future for Ireland - the Energy Policy Framework 2007-2020”¹³⁴ sets out a number of strategic goals to support achievement of the overall policy objectives. This includes a specific ocean (wave and tidal) energy target of 500 MW by 2020 and this target has been restated in the current Programme for Government.

The “Fisheries Partnership Committee” is a partnership which convenes every 2nd month, gathering the heads of Irish fishermen and Irish marine scientists, to assess technological issues and to jointly overcome barriers for local and regional collaboration of stakeholders. The meetings aim to bring different stakeholder groups together, e.g. Fishermen and scientists to clarify potential disagreements on where fish stock levels are located. Besides, workshops are organised for different subsectors, e.g. for fishing and the biotech sector.

Informal arrangements that have been implemented to develop synergies described in 1.3

At a more informal arrangement, projects such as an engineering database of all companies that have potential to feed their services and products into the eventual supply chains for ocean energy. However, that seems to be more on a case-by-case basis.¹³⁵

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¹³¹ http://www.seai.ie/Renewables/Ocean_Energy/Strategic_Environmental_Assessment_of_the_ORED/

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¹³³ According to qualitative interview compiled

¹³⁴ <http://www.dcenr.gov.ie/NR/ronlyres/54C78A1E-4E96-4E28-A77A-3226220DF2FC/30374/EnergyWhitePaper12March2007.pdf>

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3.8 List of interviewees

Name	Organisation	Thematic areas
Barbara Fogarty	National Co-ordinator National Marine Technology	Can advise on potential industry / academia
Dermot Hurst	Irish Marine Institute	Programme Manager
Eoin Sweeney	Sustainable Energy Association of Ireland (SEAI)	Head of the Ocean Energy Development Unit
Dr. Stephen Hynes	SEMRU, University of Galway	Senior Researcher, National University of Galway, Ireland. SEMRU
Dr Peter Heffernan	Irish Marine Institute	CEO, Irish Marine Institute
Dr. Ilaria Nardello	Irish Marine Institute	Coordinator – Ireland's National Marine Biotechnology Programme

3.9 ANNEX I – Ireland – a national case study

This information beneath has been kindly provided by the Irish Marine Institute on 26th June 2012 by email to Ecorys as Lead Partner of the consortium. It served as a background to the drafting of the Final cluster report Ireland. Beneath is a copied version of it, for reasons of transparency.

Abstract/Summary

Ireland is a maritime nation with a relatively small and underdeveloped ocean economy in relation to its available marine resources and sea territories (Population: 4.5 million; GVA: €1.44 billion; 1% GDP; Sea territories: 880,000 km²). The essence of the Irish approach to Maritime / Regional Clusters, as proposed under the Integrated Maritime Policy for the European Union, is to foster national co-operation, mobilising national investment, capacities and infrastructures to focus on external / global markets rather than encourage internal competition between regions (i.e. within in Ireland). Thus, while recognising the benefits of a regional cluster approach, given its small size and limited financial and human resources, the focus for development has been to mobilise a national effort to maximise sustainable marine resource development on a national rather than a regional basis.

The ocean economy is defined as *including any economic activity which directly or indirectly uses the sea as an input.*

1. Background

Ireland is an island on the Atlantic periphery of the European Union, located to the northwest of continental Europe. It is the third largest island in Europe and the twentieth-largest island on Earth. The island of Ireland consists of a land mass of 84,421 km², made up of the Republic of Ireland (Population: 4.6m, Land area: 70,282 km²) and Northern Ireland, (Population: 1.8m; Land mass: 14,139 km²) which is part of the UK

The Irish Ocean Economy (2007)

Direct GVA:	€1.44 billion
GDP (%):	1%
Turnover:	€3.4 billion
Direct/Indirect GVA:	€2.4 billion
Employment:	17,000 FTE
Workforce (%):	1%

The marine resources (Annex 1) and maritime territories (880,000 km²) of the Republic of Ireland are significant though underdeveloped. Ireland's coastline, inshore and offshore waters:

- Support a rich and diverse range of ecosystems, habitats and species and unique land and seascapes;
- Contain some of the largest and most valuable sea fisheries resources in Europe;
- Are the western gateway for shipping to Europe's busiest seaports;
- Are an ideal location for finfish, shellfish and seaweed aquaculture;
- Are amongst the richest and most accessible renewable energy (wind, wave and tidal) resources in the world;
- Contain significant oil & gas resource potential as evidenced by recent discoveries and ongoing research;
- Provide opportunities to develop new products and services;
- Offer spectacular tourism and leisure opportunities and a rich maritime culture and heritage;
- Contributes to our citizens wellbeing, health and quality of life.

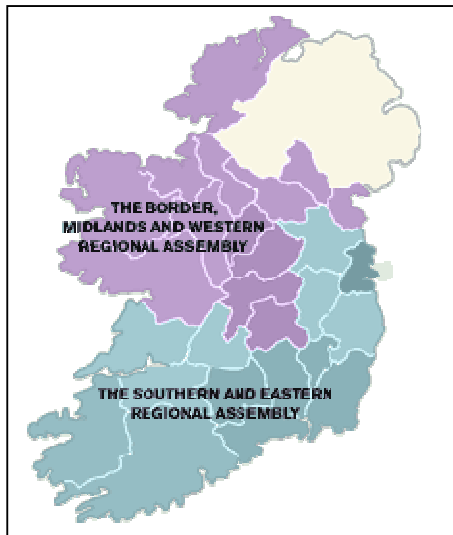
In terms of contribution to GDP (Gross Domestic Product), in 2007, Ireland generated €3.4 billion in turnover and €2.4 billion in direct and indirect Gross Value-Added (equivalent to 1.2% of GDP) from its ocean economy. This provides employment for over 17,000 people full time equivalents (51, 000 direct and indirect), about 1% of the total workforce¹³⁶.

The Irish ocean economy comprises a multitude of small, medium and large enterprises operating across a spectrum of sectors. 94% of these enterprises are in established ocean industries (e.g. shipping & maritime transport, water-based tourism and leisure, seafood processing, fisheries, aquaculture, marine manufacturing, marine services and oil and gas) with seafood and tourism representing 60% of this. New & Emerging Ocean Industries (e.g. Renewable Ocean Energy, Marine Commerce, High-Tech Services and Marine Biotechnology) represent 6% of turnover. According to global market forecasts undertaken by the Marine Institute^{137, 138} these emerging sectors, combined with more established sectors, offer significant potential for sustainable economic growth.

In terms of regional and rural development, Ireland's ocean economy is distributed widely throughout the country, with a large proportion occurring outside the most developed regions. This is particularly true of many of the activities involved in the commercial exploitation of primary marine resources e.g. commercial fishing, aquaculture and seaweed harvesting have an important role in the development of many regional economies particularly along the western seaboard and play a key role in rural development; providing livelihood options in rural areas where few other employment or income sources exist. Marine tourism and leisure activities offer further opportunities for rural development in the less developed coastal regions of the country and also offers an alternative to fishing communities wishing to diversify into other marine- based activities.

Governance and Government Structures

The Republic of Ireland has a relatively centralised administration. Responsibility of ocean governance is spread across a number of Government Departments (Ministries) though is increasingly focussed on the Dept of Agriculture, Food and the Marine. An **Inter-Department Marine Co-Ordination Group**, chaired by the Minister for Agriculture, Food and the Marine and hosted by the Department of An Taoiseach (Prime Minister) was established in 2009 to better co-ordinate policies and strategies related to the sustainable development of marine resources, including the Integrated Maritime Policy for the European Union (2007), the Marine Strategy Framework Directive (2008) and the European Union Strategy for the Atlantic (2011).



¹³⁶ Ireland's Ocean Economy (2010) Socio-Economic Marine Research Unit, NUI-Galway. 48pp.

¹³⁷ Marine Institute (2005). Marine industries global market analysis. Marine Foresight Series No. 1. Marine Institute.

¹³⁸ Marine Institute (2005). Ireland's ocean economy and resources – A Briefing Document. Marine Foresight Series No. 4. Marine Institute.

There are 34 Local Authorities in Ireland, including 29 County Councils and 5 City Councils. At a regional level, 8 Regional Authorities (NUTS III) co-ordinate certain activities of the Local Authorities and play a monitoring role in relation to the use of EU Structural Funds.

The country is further designated into two NUTS II Regions, with two Regional Assemblies (BMW: Border, Midlands and Western Regional Authority; S&E: Southern and Eastern Regional Assembly) being responsible for managing the Objective 2 Regional Competitiveness & Employment programmes. These regionalisation arrangements were negotiated by the Irish Government in the context of Lisbon Agenda (2000) for the 2000-2006 Structural Funding period. The NUTS status of these Regions is currently under review as part of the preparations for the next Multi-annual Financial Framework (2014-2020).

2. Marine Foresight (2005-2006)

Paralleling the development of the EU Green Paper: Towards a future Maritime Policy for the European Union: A European Vision for the Seas and Oceans (2006) and the subsequent Integrated Maritime Policy for the European Union (2007), between 2005-2006, a Foresight Initiative¹³⁹ was undertaken to assist the existing and largely indigenous Irish marine sub-sectors to improve their overall competitiveness and to identify new knowledge-based opportunities based on the development of marine resources. This foresight exercise resulted in the *Sea Change Strategy: A Marine Knowledge, Research & Innovation Strategy for Ireland: 2007-2013*¹⁴⁰.

The foresight study highlighted a number of areas for development and identified the need to strengthen and/or develop research, technology, development and innovation capacity, specialist infrastructures (e.g. wave energy test and demonstration facilities) and services (e.g. seabed mapping) to support this development. Amongst the areas highlighted for development were:

Ireland is an **Innovation follower** with an above average performance. Relative strengths are in human resources, open, excellent and attractive research systems and economic effects. Relative weaknesses are in finance and support, linkages & entrepreneurship, intellectual assets and innovators.

Innovation Union Score Board 2011

- Seafood: Production – Processing – Added Value;
- Renewable Ocean Energy;
- Emerging Technologies- Advanced Marine Technologies (e.g. sensors) and Marine Biotechnology;
- Maritime Ports and Shipping.

National research funds from the national **Strategy for Science, Technology and Innovation** (SSTI) Programme were used to develop new capacity in identified gap areas, including in:

- Ecosystem Approach To Fisheries/Environmental Management;
- Marine Economic and Social Research;

¹³⁹ Marine Institute (2006) *Sea Change (2007-2013) Part II: Marine Foresight Exercise for Ireland*. 202pp.

¹⁴⁰ Marine Institute (2006) *Sea Change A Marine Knowledge, Research & Innovation Strategy for Ireland: 2007-2013*. 138pp.

- Marine Sensors and Communications Marion Biodiscovery/Biotechnology;
- Fish Population Genetics;
- Renewable Ocean Energy;
- Marine Functional Foods;

Investments were made primarily in human capacity building, mobilising existing resources and investments and encouraging inter-disciplinary and inter-institutional co-operation and North-South collaboration.

Areas of particular attention included:

Renewable Ocean Energy: Ireland's coastline, inshore and offshore waters are amongst the richest and most accessible renewable energy (wind, wave and tidal) resources in the world. This and the opportunities presented are reflected in the recent **Strategy for Renewable Energy: 2012 – 2020**. Published by the Department of Communications, Energy and Natural Resources in 2012, the strategy argues that the development of renewable energy is central to overall energy policy in Ireland. Renewable energy reduces dependence on fossil fuels, improves security of supply, and reduces greenhouse gas emissions creating environmental benefits while delivering green jobs to the economy, thus contributing to national competitiveness and the jobs and growth agenda.

The Strategy identifies a number of goals including:

Strategic Goal 1: Progressively more renewable electricity from onshore and offshore wind power for the domestic and export markets;

Strategic Goal 3: Green growth through research and development of renewable technologies including the preparation for market of ocean technologies.

In support of this Strategy, and earlier work by Sustainable Energy Ireland (SEI) and the Marine Institute (2005)¹⁴¹, significant investments has been made in research capacity and infrastructures, e.g. Wave Energy Test Tank Facilities at UCC, Pilot Wave Energy Test Site Spiddal, Galway and plans for a full scale Wave Energy Test site off Belmullet, Co Mayo. This is supplemented by the establishment of an Ocean Energy Development Unit (OEDU) as part of Sustainable Energy Authority of Ireland (SEAI) and the setting up of an Irish Marine Renewables Industry Association (MRIA).

Seafood: The seafood sector, including sea fisheries, aquaculture, seafood processing and added-value represents an important component of the Irish ocean economy with an annual sales value of €719 million and supporting 11,000 jobs. This, in spite of the fact that while Ireland is surrounded by some of the most productive fishing grounds in Europe, the Irish share of these fishing opportunities represent only 21% by tonnage and 17% by value. **The Food Harvest 2020 Report**¹⁴², published in

¹⁴¹ Ocean Energy in Ireland: An Ocean Strategy for Ireland (2005). Department of Communications, Marine and Natural Resources .

¹⁴² Food Harvest 2020 - A Vision for Irish agri-food and fisheries www.agriculture.gov.ie/agri-foodindustry/foodharvest2020/

July 2010 by the then Department of Agriculture, Fisheries and Food (DAFF), sets out a strategic blueprint for the development of the agriculture, food, fisheries and forestry sector and a vision to grow the seafood industry to €1 billion and employment to 14,000 by 2020 based on the premise of smart, value-added and green growth. In support of this, the **NutraMara – Marine Functional Foods Initiative** was established mobilising expertise in Teagasc (Agricultural Research Institute), the National University of Ireland, Galway, University College Dublin, University College Cork, University of Limerick and University of Ulster (cross-border partner).

Smart Oceans: Recognising the opportunity for new knowledge, emerging technologies and innovation to bring new opportunities to (a) further develop traditional marine sub-sectors (e.g. fishing, aquaculture, seaweed, shipping, tourism, oil and gas) and (b) to create new opportunities and sectors such as advanced technology, renewable ocean energy, marine biotechnology, etc., the Marine Institute's Marine Technology Programme has established:

The SmartBAY Facility SmartBAY Galway is a national research infrastructure comprising of a network of buoys, seafloor cables and other infrastructure, supporting a range of sensors, information systems, telemetry and other communication technologies. SmartBAY provides a focal point for academic-industry co-operation in advanced marine technology and ICT systems, *in-situ*, real time oceanographic monitoring, and test and demonstration facilities for marine industries.

The SMARTOCEAN Cluster: Launched in 2010, the **SMARTOCEAN Strategy** (*ICT for the Sea*) seeks to harness Ireland's natural marine resources and specialist expertise in marine science and ICT to establish Ireland as a leader in the development of high value products and services for the global marine sector¹⁴³. This includes the delivery of next generation technology products and services for marine sectors including aquaculture, environmental monitoring, shipping and security and marine renewable energy. Supporting the implementation of the SMART OCEAN Strategy is the SMARTOCEAN Cluster, a national co-operative platform of research centres, academic institutes, Multinational Enterprises (MNEs) and indigenous Small to Medium sized Enterprises (SMEs). These facilitate the provision of remote sensing systems, data management and visualisation tools, modelling, simulation, forecasting and engineering design supporting operational management. A number of companies have also developed products and services based on patented research from National Centres of Research Excellence.

Marine Biotechnology: In recognition of the potential value of marine organisms as a source of next generation materials and processes for the animal and human health, biomaterials, pharmaceutical and nutraceuticals, and food sectors, Ireland is working towards the development of a Marine Biotechnology cluster. Ireland has a foundation of research and industry activity on which to build such a cluster. The Marine Institute fleet of research vessels, and the deep-sea remotely operated vehicle (ROV), are essential elements of a supporting infrastructure for biodiscovery. Significant national funding is supporting capacity building through a series of grants for Biodiscovery (€7.3m), Fish Population Genetics (€3.7m) and Marine Functional Foods (€5.2m)

¹⁴³ SMARTOCEAN Ireland – Harnessing Ireland's Potential as a European and Global Centre for Ocean Technologies. Marine Institute (2011)

research. Irish researchers also participate in a number of EU funded projects in marine biomass production. Irish industry has already created novel products based on marine origin materials, including food flavour compounds (Cybercolloids Ltd) and human health supplements (Marigot Ltd).

iMERC – The Irish Maritime and Energy Resource Cluster (www.imerc.ie).

iMERC is an innovation cluster established by University College Cork, the National Maritime College of Ireland (NMCI) and the Navel Service. Whilst in once sense iMERC is a Regional Cluster, centred on the new research and enterprise campus at Ringaskiddy, Cork, it has a national and international focus, promoting island wide co-operation and industry support in the areas of marine energy (marine renewable and offshore hydrocarbons), maritime ICT, shipping logistics and transport, maritime security and safety and marine recreation.

The extended maritime campus under development at Ringaskiddy, Cork Harbour, builds on infrastructure already in place with the National Maritime College of Ireland and the Irish Naval Service Headquarters and Dockyard and plans by University College Cork to construct the Beaufort Laboratory on an adjacent site. Upon completion in Autumn 2013, this will be one of the world's largest marine renewable energy research facilities, supporting a trajectory of growth in development of a sector that could yield up to 52,000 jobs from wave energy for Ireland by 2030. Industry suites will be incorporated for the growing number of commercial enterprises attracted to the location, and the spin out companies that are beginning to emerge.

In June 2012, iMERC received a Public Service Excellence Award as one of 20 projects that were singled out for demonstrating innovation and excellence across the full breadth of State services.

3. Harnessing Our Ocean Wealth: *New Ways – New Approaches – New Thinking*

In 2011, the Irish Government, in recognition of the underutilisation of Ireland's ocean economy, initiated a public consultation “**Our Ocean Wealth: Towards Integrated Marine Plan for Ireland**” with a view to:

- providing a new momentum for growth in the marine area;
- ensuring government Departments worked together more efficiently and effectively on the diverse issues related to the marine,
- responding to EU marine/maritime initiatives such as the Integrated Maritime Policy for the European Union (2007), the Marine Strategy Framework Directive (2008) and the European Union Strategy for the Atlantic (2011).

As Taoiseach, I want to see us reconnect to the sea in a way that harnesses the ideas, innovation and knowledge of all our people, at home and abroad. I want to see us setting out to secure for ourselves and our children the social, cultural and economic benefits that our marine assets can deliver.

An Taoiseach (Prime Minister), Enda Kenny, TD
February 2012.

The first step in developing an integrated marine plan was through the public consultation exercise (February – March 2012) which sought to gather the widest possible source of ideas and opinions to better inform the process¹⁴⁴.

¹⁴⁴ Our Ocean Wealth – Towards an Integrated Marine Plan for Ireland. Irish Government (2012).

The Inter-Department Marine Co-Ordination Group is currently reviewing the input (over 190 submissions) received through the public consultation exercise. A new Report, **Harnessing Our Ocean Wealth: An Integrated Marine Plan for Ireland**, is now in preparation. This Report will outline the actions that will deliver An Integrated Marine Plan for Ireland. It will set out the Government's **Vision** and **High-level Goals**, and the **Key Actions** to be taken to put in place the appropriate policy, governance and business climate to enable Ireland's marine potential to be realised. It will define a roadmap for Ireland's ocean economy that will ultimately lead to an integrated marine plan for Ireland, in line with best international practice, and in keeping with Europe's approach to an integrated maritime policy.

Annex 1: Our Ocean Wealth– Some Economic Facts & Figures.....

<p>Tourism & Leisure</p> <ul style="list-style-type: none"> ➤ Marine tourism and leisure is estimated to represent 7% of our overall tourism and leisure sector and contributed €453 million to the Irish economy in 2007. ➤ Over 200 cruise liners, carrying 205,000 passengers, visited Ireland in 2010, an increase of over 200% in the last decade. ➤ In recognition of this opportunity, Fáilte Ireland, are preparing a policy paper to provide insights and direction for their work in this area. 	<p>Shipping, Ports & Services</p> <ul style="list-style-type: none"> ➤ Maritime shipping, ports and services are critical to Ireland. Sea-based transport accounted for 99% of the total volume (45 million tonnes) and 95% of the total value (€128 billion) of the goods traded (imports/exports) through Irish ports in 2010. ➤ There was a 40% increase in the numbers of firms operating in the international shipping services sector between 2006 -2010. In 2010, employment in this niche services sector in Ireland grew by 10%. ➤ Marine commerce and the provision of marine financial services is a growing sector - marine commerce had a turnover of €99.5 million in 2007.
<p>Seafood & Seaweed</p> <ul style="list-style-type: none"> ➤ The Irish seafood sector has an estimated annual sales value of €700 million with a potential to increase revenue to €1 billion by 2020. ➤ Irish seafood exports increased by 14% in 2010 and 13% in 2011, to €420m. ➤ There is significant scope to expand Ireland's aquaculture industry, with increases expected from both conventional aquaculture and the new deep sea salmon farming initiative, amounting to 78% in volume of production by 2020. ➤ The seafood sector employs close to 11,000 people, primarily in peripheral coastal locations. With increased economic activity this is expected to reach 14,000 in 2020. ➤ Ireland's seaweed industry is worth approximately €18m per annum, processing 36,000 tonnes of seaweed (entirely from wild resources). 	<p>Energy</p> <ul style="list-style-type: none"> ➤ Ireland's offshore Atlantic margin is estimated to hold substantial 'potential, yet-to-find' hydrocarbon reserves of some 10 billion barrels of oil equivalent (including gas). ➤ Total investment to-date by the private sector in exploration activity is estimated at approximately €3 billion, resulting in four commercial discoveries (three off Cork and the Corrib Field, off Mayo). ➤ Ireland's offshore wind, waves and tides have the potential to offer a source of clean, green, renewable energy along with exciting new commercial opportunities (services), provided the technologies become commercially viable. ➤ The marine renewables sector saw an increase of activity from €18 million in 2003 to €101 million in 2007. In 2007, eight companies were actively involved in the design, development, testing and deployment of marine renewable energy devices.
<p>ICT and Biotechnology</p> <ul style="list-style-type: none"> ➤ Fish, shellfish, seaweeds and other marine species are a recognised source of functional ingredients (i.e. health-promoting additives) that offer huge potential for Ireland's large food and ingredients companies to target the \$300bn global market for functional foods and ingredients. ➤ Marine-derived drugs, enzymes and bio-materials (e.g. glues and bone replacement) are the subject of significant research and commercial interest. Irish companies target markets for animal health and horticultural products using compounds derived from native Irish seaweeds. ➤ Over 50 ICT companies (SMEs and multinationals) are involved in the Irish SmartOcean cluster, targeting the fast-growing market for marine ICT products and services for the oil and gas, renewable ocean energy, and transport and shipping sectors and for environmental monitoring and maritime security and surveillance. 	<p>Marine Research & Innovation</p> <ul style="list-style-type: none"> ➤ Ireland's marine research capacity has been transformed over the last decade, through a cumulative investment of over €250m in human and capital infrastructure, and research programmes. ➤ Ireland's Seabed Mapping Programme (INSS & INFOMAR), is one of the largest civilian marine mapping programmes worldwide. An independent study has shown it to have a benefit to cost ratio of over 4: 1. ➤ This research and innovation capacity is a vital foundation and critical success ingredient to achieving greater economic growth and job creation in our marine sector.

4 Gulf of Venice

4.1 Summary and highlights

Introduction

The Gulf of Venice comprises the Italian coastline from the Po Eastuary to Trieste, the complete Slovenian coastline and coastline of the peninsula of Istria in Croatia. It is a region with intense use of the maritime and coastal area:

- Several major ports: Venice, Trieste, Koper, Rijeka and many smaller ports. The major ports generate around 100 million tons of freight and 4.2 million passengers per year.
- Several larger cities: Venice/Mestre, Trieste, Pula, Rijeka
- Intensive tourism industry along the entire coastline, but notably in/around Venice, eastward of Venice, along the Slovenian and Croatia coastline
- Industrial complexes, amongst which large shipbuilding and repair yards in the coastal regions, notably in Italy: Porto Marghera (near Venice), Monfalcone, Trieste, but also Koper and Rijeka.
- Fishing vessels operating from several smaller ports, aquaculture practiced at several places along the coastline.

At the same time, the coastal area in Italy consisting of coastal plains, wetlands and lagoons in Italy is an environmentally vulnerable area. The city of Venice and the Lagoon are particularly prone to flooding; an extensive project (MOSE project) is under execution aimed at flood protection of the city of Venice. The Croatian coastline is rocky, with many small bays and inlets of high natural value.

The area is characterised by a few well developed economic sectors that have been practiced there for decades if not ages: maritime transport, coastal industry (among others shipbuilding), coastal and cruise tourism and fisheries. Though these are rather mature industries, in particular maritime transport and tourism are still growing. Shipbuilding is fairly stable and fisheries are declining.

There are not many new or future potential activities seen yet. Aquaculture is a more recent development, partly replacing marine fishing. In the energy sector there is a small wind farm in the Gulf of Trieste and an offshore LNG terminal near Porto Levante.

Synergies

- There are limited synergies between tourism and fisheries. Apart from the fact that artisanal fishery ports often are great tourist spots, fishermen increasingly rent out their boats to tourists for fishing trips.
- There are established synergies between the maritime transport function and the shipbuilding and repair industry. Both activities have developed jointly and mutually reinforced each other, profiting from the strong maritime position of the region that dates back to the era of the Republic of Venice. Though somewhat eroded by globalisation of both industries, these synergies still exist.

Tensions

There are strong tensions between the existing activities, mainly concerning space and environment:

- Maritime transport competes with other functions (notably tourism and fisheries/aquaculture) for space, as the increasing freight and passenger volumes require additional port infrastructure.
- Tourism developments compete with all other sectors for space.
- Particularly along the Slovenian coastline space is under pressure: along the 47km of coastline one industrial port, several fishing ports and several marinas and touristic developments are competing for space.
- Tourism developments also form a pressure on the environment, due to pressure on discharges into the sea, construction developments for touristic purposes in environmentally fragile areas and sand extraction for supplementation of beaches.
- Fisheries and aquaculture also put pressure on the environment. Maritime transport and industrial activities are more confined to specific locations, but do form threats to the environment (risk of collisions, accidents).
- A particular tension is between flood protection (particularly the MOSE project) and the existing economic activities: tourism (notably cruise), maritime transport, fisheries and aquaculture in the Gulf of Venice may all be affected by the use of flood barriers. This tension is recognised in the project.

Policies

Policies aimed at relieving the tensions between various activities or tensions caused by certain activities are increasingly tackled in a coordinated way:

- In Slovenia, the National Marine Spatial Planning Framework coordinates the various functions along the coastline.
- ISPRA (Institute for Environmental Protection and Research) in Italy has a specific office for the Venice Lagoon, aiming at maritime surveillance through monitoring and implementation of the maritime strategy.
- The MOSE project, aimed at protecting the Venice Lagoon from flooding, takes into account the effects on tourism, the environment, fisheries and maritime traffic.

Lessons to be learned

- The policies aimed at relieving tensions are starting to be implemented across municipal and regional levels, in Slovenia even at a national level, but not yet internationally. Introducing a cross border element to marine spatial planning could enhance the effectiveness of policies, particularly in the eastern Gulf of Venice where the borders of Italy, Slovenia and Croatia are very near to each other.
- Further synergies between sectors could be researched and created, such as for instance between tourism and the environment in the form of eco-friendly tourism.

4.2 General description

Since antiquity the lands around the Gulf of Venice have been a region of transit and connection between the lands beyond the Alps and the sea, due to their geographical position and a variety of other reasons, the area has proved to be a “melting pot” of peoples of different languages and cultures. The gulf of Venice covers the northern extreme of the Adriatic Sea and it is demarcated by the Po river delta in the southwest and the Istria peninsula to the southeast. The gulf is divided between 3 countries as Italy, Slovenia and Croatia share its coastline. Veneto and Friuli Venezia Giulia are the regions that consist the Italian side of the gulf. The Slovenian statistical region of Obalno-Kraska forms the Slovenian side and the Croatian county of Istria comprises the easternmost part of the gulf. The most important cities of the coastal area are Venice (IT), Trieste (IT), Chioggia (IT), Koper (SI) and Pula (CR).

Figure 4.1: Map of the Gulf of Venice



(source: www.viamichelin.com)

Many rivers flow into the Gulf, mainly from the Italian side. Po, Adige, Piave, Tagliamento and Isonzo are the larger ones. The lagoons of Marano and Grado mark the mouth of the Isonzo River. At the rest of the western side of the gulf (westward from Trieste), marshes, sand pits and eventually high and rocky little bays are found. The eastern side of the gulf is more rigid as the Istrian Plateau peninsula starts here. The beaches, sand dunes and coastal wetlands at the Italian part of the gulf form a fragile ecosystem that is threatened by increasing tourist exploitation, inland agriculture and pollution of coastal waters. (PAP/RAC, 2007)

The climate at the region is basically Mediterranean along the coast. Summers are hot and dry and the sun shines an average of 2400 hours annually. Winters are mild and snow is rare. The average air temperature is between 14°C and 16°C with the temperatures fluctuating from an average of 6°C at January to an average of 24°C for the months of July and August that are the warmest months of the year. (Croatian Bureau of Statistics, 2011). The sea temperature peaks in August with an average of 24°C while it is coldest in March with an average of between 9°C and 11°C. The prevailing wind is a north-eastern wind named “bora” with velocities that can build up to 50m/s. The prevailing sea currents at the gulf are rather weak reaching a maximum speed of 1 knot. (Marine Meteorology Division, 2003). Only after heavy precipitation, the inflow of the rivers can cause temporary currents of higher speeds. The tide at the coastline of the gulf of Venice ranges between approximately 0.5 and 1.5 meters. If high tides combine with the southern wind “sirocco”, flooding often occurs at the city of Venice. Finally, the depth of the seabed of the gulf ranges from 20 to 65 meters. (Muromtsev, 1965).

4.3 Socio-economic characteristics

Population and general economy

Figure 4.2: City of Chioggia, Veneto



(<http://www.shape-ipaproject.eu> last accessed April 16th, 2012)

On the Italian side, the gulf of Venice borders the regions of Veneto and Friuli-Venezia Giulia. The coastal provinces of those regions are the provinces of Venezia and Rovigo at the region of Veneto and the provinces of Gorizia, Trieste and Udine at the region of Friuli-Venezia Giulia. Those coastal provinces have a combined population of 2.9 million inhabitants. The unemployment rate at the two regions is around 5.7%, against 9.3% overall in Italy. The

agricultural sector in the area is quite expanded and the region of Veneto is one of Italy's leading regions in fisheries. Tourism is very important for the region; Veneto is by far the most tourist-attracting region in Italy. Another pillar of the local economy is industrial production which occupies 39.2% of the local workforce (well above national average). (Istituto nazionale di statistica, 2011).

Figure 4.3: City of Koper, Slovenia



(<http://www.mozgasvilag.hu> last accessed April 16th, 2012)

The coastal region in Slovenia has a population of 111 thousand inhabitants. The region has the lowest unemployment rate in the country (7.9%) while the average monthly gross income per person is the second highest after that of the Ljubljana region. The region is the only sea access for Slovenia; which has a coastline of 47km. Its natural features enable the development of tourism, transport and special agricultural crops. The economic activity of the region relies strongly

on the extended service sector that covers 76.1% of the local economy. Hotspots of economic activity are the port of Koper and the seaside and spa tourism along the coastline. The region attracts more than one fifth of the tourists in Slovenia each year. The agricultural sector plays a limited role in the regional economy (Statistical Office of the Republic of Slovenia, 2012).

The Croatian county of Istria has a population of 206 thousand inhabitants. The unemployment rate for the county is about 8.9% which is well below the country average (over 17%). The industrial sector of the county of Istria produces the 8.3% of the total industrial production of Croatia. The county of Istria accounts for more than a fourth of the total tourist inflow in Croatia; it has an extensive tourist sector. Besides the tourist sector, the economy of Istria is characterized by high investments in the construction and the transportation sector. (Croatian Bureau of Statistics, 2011). The ports of the Istria County, under the coordination of the Harbour Master's Office of Pula, account for the 16% of the overall freight transport of Croatia. (Croatian Bureau of Statistics, 2011).

Main sea-related economic functions

There is a wide range of maritime economic activities found along the gulf of Venice. The dense population concentration at the coastal area, alongside the intensification of the marine environment exploitation leads to the advent of a growing competition for spatial and natural resources between economic functions. The main maritime functions and economic activities are discussed in the following sections.

Maritime transport

The gulf of Venice has always been one of the main sea gateways to Central Europe. Thus important ports have developed along its coastline as different countries were competing for the access to the sea. There is a variety of sizes of ports around the gulf. From major ports of national and European importance, such as the ports of Trieste and Koper (Figure 1.4), to small-scale ports mainly of local interest such as the ones found at the coast of the Istrian peninsula; Porec, Pula, Rabac, Rovinj etc. The ports that can be found in and near the gulf of Venice have different characteristics; for example, the port of Trieste is a port of historical importance sided by a big industrial zone, on the other hand the port of Koper is very competitive, also due to its modern infrastructure while other ports of the area, such as Rijeka exploit their deep-sea vessel handling capacity and the port of Venice is characterised by a large flow of passenger traffic, both ferry and cruise passengers. In the following table, aggregated figures are provided for the passenger and freight transport handled by the ports of the gulf of Venice. The Italian side consists of the ports of Chioggia, Venice, Porto Nogaro, Monfalcone and Trieste. The port of Koper accounts for the Slovenian side while the ports under the Master's port authority of Pula account for the Croatian ports.

Table 4.1: Passengers and Freight Transport at the Ports of the gulf of Venice

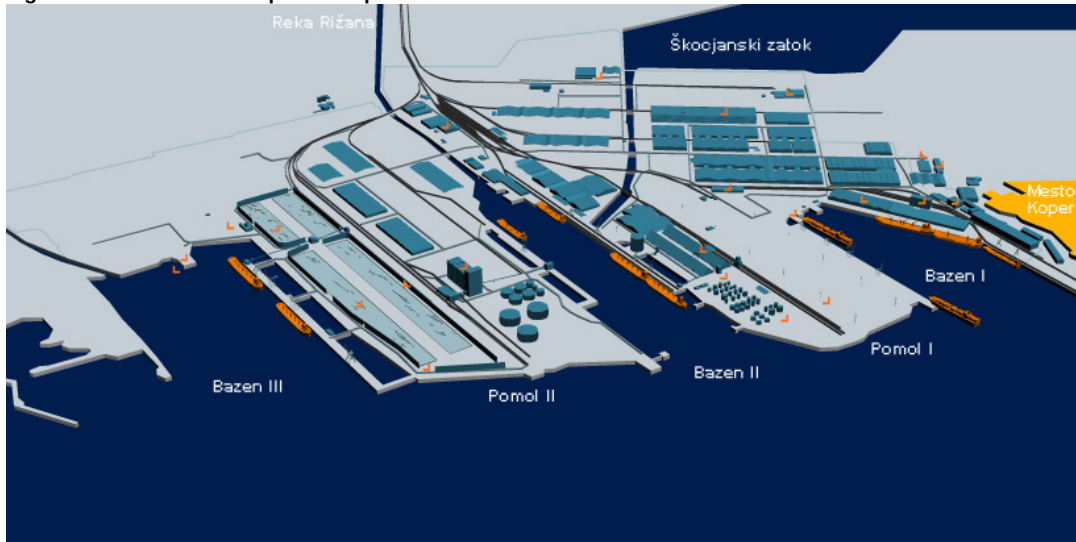
	Passengers (millions)	Freight (million tons)
Italian Ports	2.12	79.9
Venezia	2.06	26.4
Chioggia	-	1.8
Portonogaro	-	1.2
Monfalcone	-	3.1
Trieste	0.06	47.4
Slovenian Ports*	0.11	15.4
Croatian Ports	2.01	4.0
Novigrad	0.05	0.5
Poreč	0.27	-
Pula	0.54	0.7
Rabac	0.61	0.9
Raša		1.9
Rovinj	0.50	-
Umag	0.04	-
Total	4.24	99.3

(Sources: (Croatian Bureau of Statistics, 2011), <http://www.confetra.it>, <http://www.luka-kp.si>)

* concerns Port of Koper only

Totalling more than 4 million passengers annually, the high use of the ports of the gulf of Venice is justified by the high touristic attraction potential of the area. Venice alone is the Italian province that attracts the highest numbers of tourists, while the Istrian coast and the small Slovenian exit to the Adriatic Sea attract millions of tourists every year as well. Moreover the ports of the gulf are also a popular destination for cruise vessels.

Figure 4.4: Overview of the port of Koper



(Source: <http://www.luka-kp.si>, last accessed May 3rd, 2012)

To put the nearly 100 million tons of freight traffic that the ports of the region handle in perspective: this amount stands for more than one third of the overall freight handled by all Italian ports together. These figures reveal the importance of the maritime transport sector of the area, not only at a local, but also at an international level. Thanks to the eastward expansion of the European Union, the unified market that is created at their hinterland favours the ports of the Northern Adriatic Sea. It is anticipated that in the near future, due to its enhanced connectivity over the European Transportation Corridors, the area will attract a great deal of international traffic. Moreover, thanks to being interconnected with the Motorways of the Seas and due to the creation of the Euro-Mediterranean Free Trade Area, the ports of the North Adriatic are expected to strengthen their Short Sea Shipping connections with the rest of the Mediterranean basin. The port of Trieste for instance is expanding with additional RoRo berths and terminal area for storing and handling trailers and containers. The anticipated increase of density of the maritime traffic in the Gulf is perceived as a potential threat to navigational safety, thus Italy, Slovenia and Croatia have adopted a Vessel Traffic Monitoring Information System (VTMIS) which assists safeguarding to avoid collision risks and avert maritime incidents while monitoring the international traffic flows.

Figure 4.5: Position of NAPA ports regarding the Trans-European Network



(Source: <http://www.portsofnapa.com>, last accessed May 3rd, 2012)

Having an advantageous penetration to a potentially large hinterland area (Figure.1.5) and also acknowledging that new opportunities open in a globalized market, the major ports of the Northern Adriatic Sea – that includes not only the ports of the Gulf of Venice, but also the ports located nearby – have formed a port association named NAPA (North Adriatic Port Association) that promotes port cooperation and lobbies in favour of their interests. The ports that participate in this

association are those of Venice, Trieste, Ravenna, Koper and Rijeka and the main interest of the association is to enhance inland connections and promote the Baltic-Adriatic Axis as a part of the Trans European Network (see also the Gdansk cluster). Better connectivity as well as expansion and modernization of port infrastructure are essential for the ports to achieve a greater share and a well established position in the international business community. Should the Trans-European corridors network be completed and provide a good connection to the ports of the area, and taking into consideration the increasing globalization of trade, the NAPA should be able to considerably expand their incoming and outgoing freight volumes in the near future. (Alto Adriatico, 2010).

Shipbuilding

The region hosts a thriving shipbuilding industry, mostly aimed at cruise and ferry vessels. Fincantieri (Cantieri Navali Italiani SpA), one of the largest shipbuilding companies in Europe, has several locations in Italy, of which some in the Gulf of Venice:

- Monfalcone (merchant/cruise ships)
- Marghera (merchant/cruise ships, near Venice)
- Trieste (company headquarters, shiprepair docks, merchant/cruise ships)

Fincantieri builds cruise vessels in both Monfalcone and Marghera, for the major cruise lines in the world, such as Carnival, MSC, and Royal Caribbean. Until not long ago, cruise ships were exclusively built at European yards, but recently Carnival ordered two large cruise vessels at Mitsubishi (Japan) for their daughter company AIDA cruises. Samsung Heavy Industries in South Korea recently announced construction of a cruise vessel too. Both examples indicate that competition from outside Europe in the cruise ship construction segment is starting to develop.

Apart from cruise vessels, the Fincantieri Yards construct naval ships, ferries, and mega yachts. In the market for naval ships, domestic shipbuilders are usually preferred, whereas ferries and mega yachts are shipbuilding segments in which European yards still hold a strong position compared to Asian yards. Another well-known shipyard in the area is Cantiere Navale Visentini. It is based in Donada and predominantly constructs ferries and ropax vessels.

In the Gulf of Venice a well developed shipbuilding industry aimed at wooden fishing vessels (of up to 13 to 14m.) used to exist, but this industry has declined as fishermen increasingly buy fibreglass boats.

Living resources

Fishing and aquaculture are very important economic activities for the gulf's economy. Veneto is among the top fishing regions of Italy while aquaculture at both Veneto and the Friuli Venezia Giulia regions is very extent. For the Veneto region, clam fishing in the Venetian lagoon is a very important economic activity, as they account for about 60% of the Italian production. Aquaculture, both mussel plants and fish farms, increasingly receive competition from aquaculture imports from Greece and Turkey, where producers are able to work at lower production costs.

In the traditional fishing sector, over-fishing threatens sustainability. Over-fishing is partly due to illegal fishing, which threatens coastal morphology too. To counteract this, fishing is nowadays allowed only within restricted lagoon areas; the management of these areas is under the responsibility of fishermen cooperatives. This should help preserving the areas and maintaining their fish production as fishermen are encouraged to take care of the water basins assigned to them. On the other side of the gulf, at the region of Friuli Venezia Giulia, fisheries and mariculture are located predominantly at the coastal area between Monfalcone and Trieste. Currently the existing trend in Italy is to replace coastal aquaculture plants with deep-sea facilities.



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