



Consulenti per la Gestione Aziendale



**STUDY ON THE ESTABLISHMENT OF A FRAMEWORK FOR
PROCESSING AND ANALYSING
MARITIME ECONOMIC DATA IN EUROPE**

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Foreword

This Study comes after a long series of studies that have attempted to define and measure the blue economy in the EU. These have provided some qualitative information but they largely reinforced what was already known from the first 2009 study¹ – that national statistical organisations are reluctant or unable to provide more detailed information than they already provide to the Commission.

So the Commission has started to make its own calculations based on publicly available data from these reports – primarily Structural Business Statistics (SBS), input-output tables, tourism statistics, the Data Collection Framework for Fisheries and the Labour Force Survey.

This study aimed to cross-check these numbers and provide additional detail from other sources.

The study confirmed that the use of SBS and the NACE classification of activities as the main data source is justified by the fact that NACE offers:

- spatial and inter-industry comparability,
- temporal comparability,
- theoretical and accounting consistency,
- replicability.

At the same time, the NACE classification does not permit to measure every maritime activity with a sufficient degree of precision, because some economic activities encompass a maritime and a non-maritime dimension alike, and it is extremely difficult to establish how much of them should be apportioned to the blue economy. For this reason, several other sources have been used to complement Eurostat data.

The study was developed through five tasks:

1. **Common delineation of the maritime activities.**
2. **Indicators for maritime activities:** after defining the list of maritime activities to include in the study, two sets of indicators were chosen to measure them: (i) indicators that are common to all activities (turnover, value added, employment, etc.) and (ii) indicators that are 'sector-specific'.
3. **Identification of sustainable data sources.**
4. **Collecting and processing the data.**
5. **Peer review process:** a peer-review group of external experts was set up to validate the findings of the research team. The peer-review group was made up of stakeholders from industry and academia, their expertise covering the different sectors of the blue economy.

As a general rule, the research team have based their estimations as much as possible on actual figures, trying to avoid assumptions and proxies. Nonetheless, since some sectors are characterised by poor data availability, certain assumptions and proxies were inevitable. They are detailed in an Annex to the Final Report.

Despite the effort put into the study, there remains a number of sectors for which, as of today, no or very few data are available:

- Blue biotechnology
- Desalination
- Dredging
- Marine equipment
- Other renewable energy
- Public sector activities

¹ Study in the field of maritime policy, "Approach towards an Integrated Maritime Policy Database", Volume 1: Main Part Study for Eurostat Contract Reference 2007/S 179-218229 – Lot 1

- Seabed mining
- Wind energy

Despite some of these sectors are poorly covered, they have been included in the list of maritime activities anyway, in case new data are made available in the future.

1 List of maritime activities

This study defines the activities that make up the blue economy as:

economic activities that (i) take place in the marine environment or that (ii) use sea resources as an input, as well as economic activities that (iii) are involved in the production of goods or the provision of services that will directly contribute to activities that take place in the marine environment.

This definition incorporates a geographic criterion (activities that take place in the marine environment), with other criteria related to the process and nature of other economic activities that may also take place on land.

Based on the above-mentioned definition, all economic activities included in the NACE classification² have been mapped; those matching with the definition have thus been included as part of the blue economy.

The NACE classification of economic activities is the foundation on which to build the new definition of the blue economy. Inter alia, it makes it possible to meet four fundamental requirements identified by Colgan³ in a study on the ocean economy carried out for the National Ocean Economics Project in the US:

- spatial and inter-industry comparability;
- temporal comparability;
- theoretical and accounting consistency;
- replicability.

However, as emerged from the mapping exercise, the NACE classification also has some limitations. As a classification, NACE was not conceived to distinguish between the maritime and the non-maritime economy, therefore it is only concerned with the nature of an activity, rather than with where it takes place or which industries it serves. This implies that, in a good number of cases, data based on NACE classification needs to be complemented with other sources or criteria in order to estimate the 'maritime proportion' of a given economic activity.

Additional sources may thus need to be used to bridge gaps in NACE, most likely when dealing with new and emerging maritime activities, which have not yet been included in the current classification system. Additional sources may also be used to elaborate estimations and / or proxies when detailed data are not available through NACE. Case-by-case, one should carefully evaluate the benefits yielded to the database by the addition of a new source against the potential problems that may arise in terms of comparability, consistency and replicability.

The economic activities – which ultimately correspond to NACE codes – included have been grouped in a number of sectors as follows:

² [http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_\(NACE\)](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(NACE))

³ Colgan CS, Measurement of the ocean and coastal economy: theory and methods. National Ocean Economics Project, USA; December 2003.

See also Colgan CS, A guide to the measurement of the market data for the ocean and coastal economy in the National Ocean Economics Program. National Ocean Economics Program, USA; January 2007.

Both studies are available at <http://www.oceaneconomics.org>

Table 1 – List of sectors and activities

Sector	NACE code	Activity
Fisheries and aquaculture	A.03.11	Marine fishing
	A.03.21	Marine aquaculture
	A.03.22	Freshwater aquaculture
	C.10.20	Processing and preserving of fish, crustaceans and molluscs
	C.10.85	Prepared meals and dishes
	C.10.89	Other food products n.e.c
Blue biotechnology	C.10.41	Manufacture of oils and fats
Extraction of oil and gas	M.72.11	Research and experimental development on biotechnology
	B.06.10	Extraction of crude petroleum
Extraction of aggregates	B.06.20	Extraction of natural gas
	B.09.10	Support activities for petroleum and natural gas extraction
	B.08.12	Operation of gravel and sand pits; mining of clays and kaolin
	B.08.99	Other mining and quarrying n.e.c.
Extraction of salt	B.08.11	Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate
	B.09.90	Support services for other mining and quarrying
	B.08.93	Extraction of salt
Seabed mining	C.10.84	Manufacture of condiments and seasonings
	B.07.10	Mining of iron ores
	B.07.21	Mining of uranium and thorium ores
	B.07.29	Mining of other non-ferrous metal ores
Desalination	B.09.90	Support services to other mining and quarrying
	E.36.00	Natural water; water treatment and supply services
Maritime transport	H.50.10	Sea and coastal passenger water transport
	H.50.20	Sea and coastal freight water transport
	H.50.30	Inland passenger water transport
	H.50.40	Inland freight water transport
	H.52.29	Other transportation support activities
	K.65.12	Non-life insurance
	K.65.20	Reinsurance
Ports (including dredging)	N.77.34	Rental and leasing services of water transport equipment
	H.52.24	Cargo handling
	F.42.91	Construction of water projects
	H.52.22	Service activities incidental to water transportation
Shipbuilding	H.52.10	Warehousing and storage services
	C.30.12	Building of pleasure and sporting boats
	C.30.11	Building of ships and floating structures
	C.28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
Ship repair	C.32.30	Sports goods
	C.33.15	Repair and maintenance of ships and boats
Wind energy	E.38.31	Dismantling of wrecks
Other renewable energy	n.a.	Offshore wind energy
	D.35.11	Production of electricity
Tourism	D.35.12	Transmission services of electricity
	n.a.	Coastal tourism
	n.a.	Cruise tourism

Sector	NACE code	Activity
Public sector	E.38.12	Collection of hazardous waste
	0.84.22	Defence activities
	0.84.26	Environmental protection
	0.84.11	General public administration activities
	0.84.24	Public order and safety activities
	E.39.00	Remediation activities and other waste management services

The sectors and activities in the table have further been grouped into:

Table 2 – List of groups and sectors

Group	Sector
Living resources	Fisheries and aquaculture
	Blue biotechnology
Non-living resources	Extraction of aggregates
	Extraction of oil and gas
	Extraction of salt
	Seabed mining
	Desalination
Shipping	Maritime transport
	Ports (including dredging)
Shipbuilding	Shipbuilding
	Ship repair
Renewable energy	Wind energy
	Other renewable energy
Coastal tourism	Coastal tourism
Other	Public sector

Some important notes:

- **Some activities are not consistent with the above-mentioned definition:** namely, ‘freshwater aquaculture’ and ‘inland water transport’ (both freight and passenger). It has been decided to include them, because they may be relevant to the blue economy of some countries (e.g. inland freight water transport in the Netherlands). This choice has also been made on account of the fact that, when querying the database, users are allowed to exclude certain activities.
- **Coastal tourism is not a single economic activity:** it rather is a set of activities undertaken by a specific type of consumer (the tourist). Tourism is an umbrella for all relationships and phenomena associated with people who are travelling, whatever the reason.
- **Blue biotechnology:** as of today, it is believed that no reliable method can be developed to estimate the size of this sector.
- **Extraction of salt:** currently available data do not make it possible to distinguish between salt extracted from sea water, and salt extracted from other sources.
- **Seabed mining:** it is not captured in the statistical classification system. Enquiries with private information providers have revealed that the activities taking place in EU waters (the geographical scope of this study) are negligible. Nevertheless, it is important to keep it in the list of maritime activities, as it is believed that there is potential for growth in the future.

- **Desalination:** official statistics do not capture the sector. Limited data are available from private information providers.
- **Insurance and re-insurance services:** insurance and re-insurance services are virtually bought by all economic activities. However, it is quite difficult to establish the share bought by each maritime activity individually. At this stage, it has been possible to do so only for the maritime transport sector, through input-output tables. At the same time, it should be noted that, when not listed separately, insurance and re-insurance services are captured when measuring the ‘indirect impact’ of each maritime activity.
- **Ports (including dredging):** a set of activities that take place in ports are included in this sector. However, the budget of port authorities – which in many EU Member States are public bodies – and their employment is not included in our measurement. Among the activities included there is ‘construction of water projects’, which also includes operations that are normally considered as dredging activities. Dredging happens to be an important economic sector in several countries, especially in Northern Europe. Therefore, it would be desirable to single it out as a separate sector. Several attempts have been made to liaise with the European Dredging Association to solve this issue, without success.
- **Marine equipment and supplies:** the industry as such is not captured in the classification system of economic activities. By combining NACE and Prodcod data, it is possible to single out certain economic activities that manufacture equipment installed on ships. However, upon further research, it has emerged that these activities only make up a very small part of the EU marine equipment industry, because the greatest part (in terms of value) of equipment installed on ships is produced by industries that manufacture components that can be installed indifferently on several means of transport. Another study has been looked at⁴ to benchmark the method used, but, upon discussing with its authors, it has emerged that the method is based on statistical data, interviews with manufacturers, and the authors’ personal knowledge, and thus could not be replicated in the time frame of the study. Furthermore, the study is not updated every year. Therefore, it has been decided not to include manufacture of marine equipment and supplies in the direct measurement of the blue economy. Nonetheless, the value added and employment generated by the sector is captured in the indirect impact of shipbuilding.
- **Public sector activities:** public sector activities are measured differently from the rest of the economy. The only common indicators available are public expenditure and employment. The public sector is also inherently difficult to measure, as Member States’ budget categories differ to a great extent, and the statistical classification available at EU level (COFOG) is not as detailed as NACE.

The research team acknowledge that the criterion adopted remains arbitrary to some extent. Nevertheless, the final selection of activities has been validated by the EU Commission and by a peer-review group specifically set up for this study. The discussion that has taken place should at least ensure that the final selection is in line with the general view of stakeholders.

⁴ BALance Technology Consulting, “Competitive Position and Future Opportunities of the European Marine Supplies Industry”, 2014.

2 Results of the study

In 2014, the blue economy of the EU⁵ generated a value added (direct and indirect) of nearly 215 billion euros. This figure tends to underestimate the actual size of the blue economy, because:

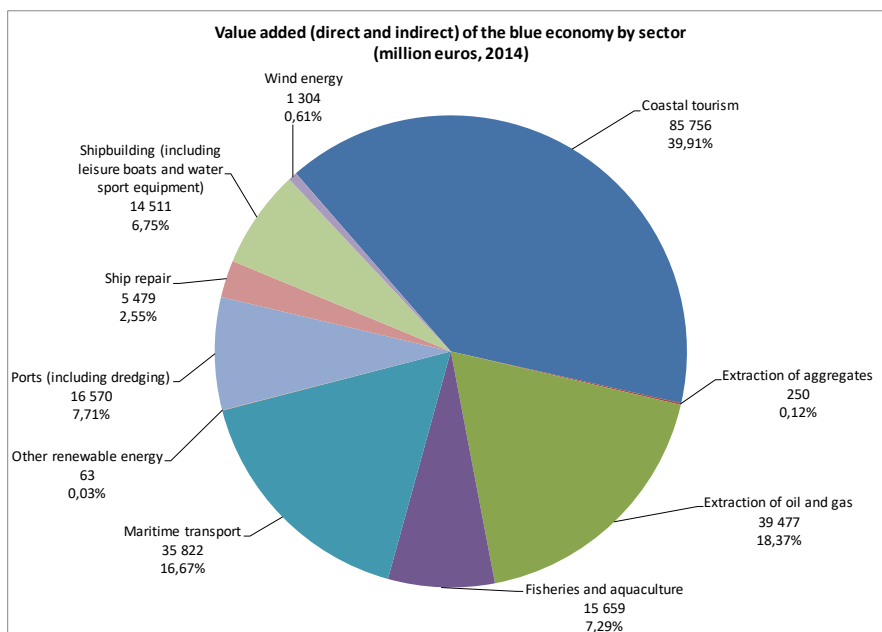
- Data are not available for certain activities (blue biotechnology, seabed mining, desalination, salt extraction). However, it is believed that having data on these sectors would not change the overall picture to a great extent.
- There are occasional data gaps.
- Indirect employment multipliers are not available for extraction of aggregates. Again, it is believed that the impact on the total value of the blue economy would be negligible.

The direct impact alone is of course lower, amounting to nearly 156 billion euros.

In terms of employment, in 2014 the blue economy generated about 5,7 million jobs directly and indirectly, while direct employment amounts to 3,2 million jobs:

The graphs below provide a detailed breakdown of direct and indirect GVA and employment by sector:

Figure 1 - Direct and indirect value added of the blue economy by sector, 2014



⁵ N.B. The full database also includes data on Norway, which, however, are not presented in the graphs.

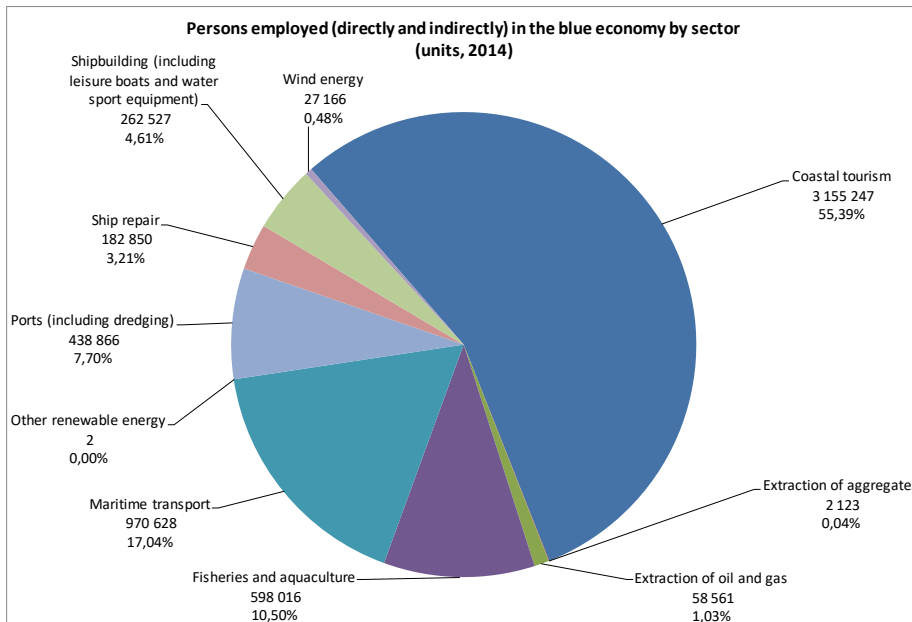
Commented [S11]: This illustrates the problem of considering equipment as a primary rather than secondary activity. We would suppose that much of indirect shipbuilding activity is equipment

Commented [AP2R1]: If you want, we can exclude 'equipment' altogether. That way, it'll be clear that in our framework equipment can only be measured as a part of the indirect impact of the blue economy.

Commented [C3]: Be more specific here because the graph title mentions "direct and indirect" while only coastal tourism is flagged as not including the indirect. Maybe to ease the reading, you can present the two graphs fig 1 and fig 2 next to each other and comment it together?

Commented [C4]: I have the same comment as for GVA, can you present the two graphs next to each other, it makes it easier to understand and compare

Figure 2 - Persons employed (directly and indirectly) in the blue economy (directly and indirectly) by sector, 2014



Coastal tourism is by far the largest economic activity in terms of value added and jobs generated. [This is because tourism is not a single economic activity, but it rather encompasses a wide set of activities centred around the tourist (accommodation, food and restaurants, transport etc.).]

It may be interesting to note that traditional sectors still make up most of the blue economy. Besides coastal tourism, extraction of oil and gas generates more than 18% of the value added of the whole blue economy, despite fossil fuels are losing their market share in Europe, as a result of low oil price and more sustainable alternatives.

Maritime transport is another 'traditional' activity that still plays a significant role, making up about 17% of overall value added.

There are revealing differences between the graphs of value added and employment. As one may expect, capital-intensive activities tend to generate more value added than employment, and the opposite is true for labour-intensive activities. Tourism, which makes up nearly 40% of value added, employs more than 3 million people, accounting for 55% of employment. By the same token, fisheries and aquaculture (a sector that also includes the fish processing industry) make up only 7,3% in terms of value added, but their share increases to 10,5% when it comes to employment.

The most interesting example in this sense is extraction of oil and gas, which alone generates 18,4% of the value added of the blue economy, but employs only 1% of the total workforce.

The above graphs give an idea of the dimension of the blue economy, which does not include the public sector. However, the public sector⁶ also pumps additional resources into the economy, with more than 30

⁶ For more details on the activities included in the public sector, please see Annex I - § Error! Reference source not found..

Commented [SI5]: Rephrase. It is an economic activity. It just doesn't have a unique NACE code.

Commented [AP6R5]: Done

Commented [SI7]: You underestimate indirect activity

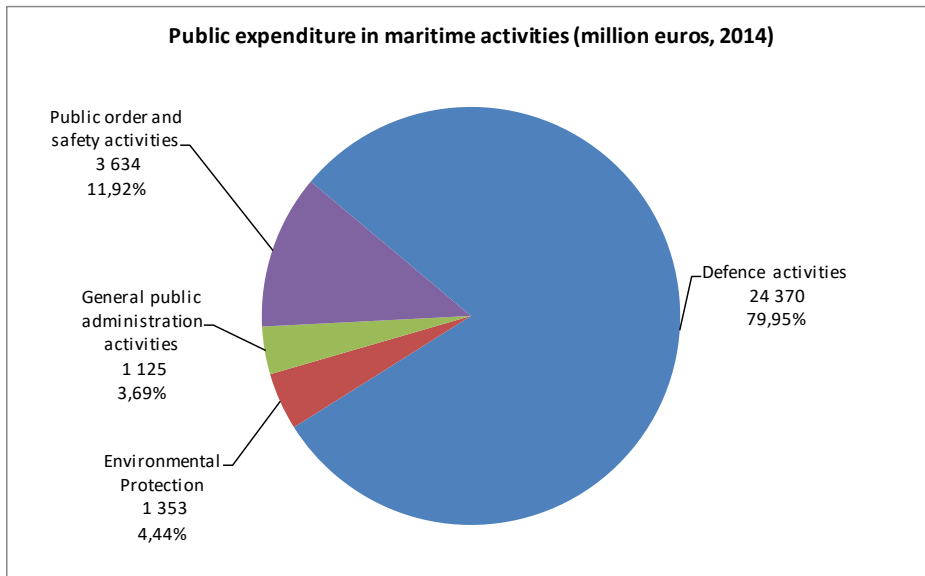
Commented [C8]: Please add a footnote referring to the section where the activities included in the graph are defined, i.e Annex I, p77. Please do this for all graphs.

Commented [AP9R8]: Ok

billions of public expenditure⁷ and about 370 000 persons employed. Once again, it is believed that this figure underestimates the total contribution of the public sector to the blue economy. Activities such as public research and education, for instance, could not be included in the database, because very few data are available at Member State level.

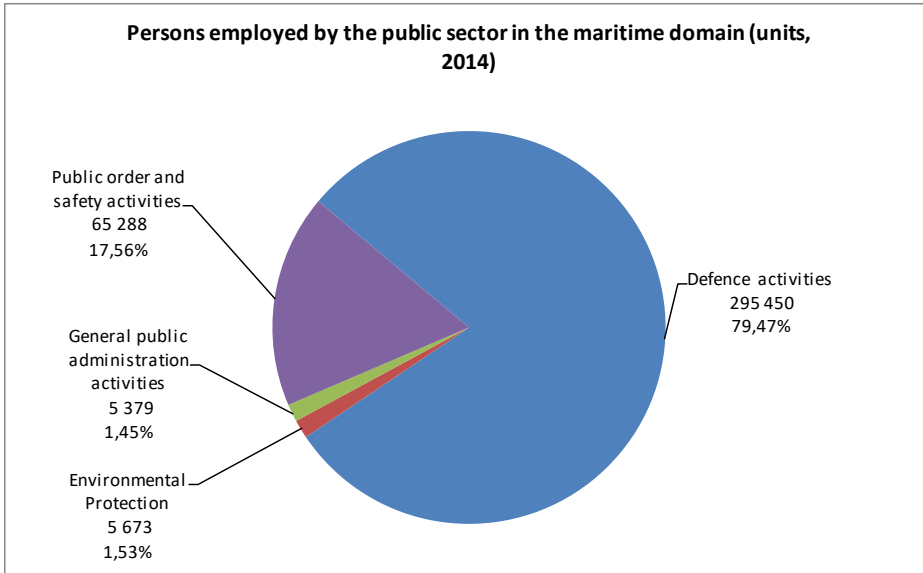
Figure 3 – Public expenditure in maritime activities, 2014

Commented [C10]: What about public research and education, I am quite sure you will get the question (also in terms of employment) as this was asked several times during the meetings either of steering group or peer review. You should maybe explain why such activities while largely in the public sector are not counted



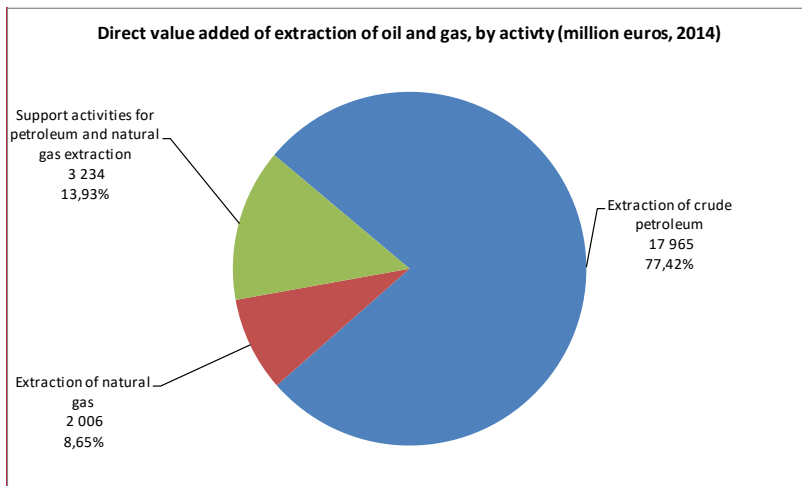
⁷ It is inherently more difficult to measure the 'maritime' public sector in EU Member State, because the classification of public expenditure is not sufficiently detailed. The actual value is probably much higher.

Figure 4 – Persons employed by the public sector in the maritime domain, 2014



It may be worth looking at some sectors more in detail. For instance, the direct value added generated by extracting oil and gas from the seabed amounts to nearly 23 billion euros, and it is possible to break down the sector⁸ to understand how the different economic activities contribute to that figure:

Figure 5 Direct value added of extraction of oil and gas by activity, 2014



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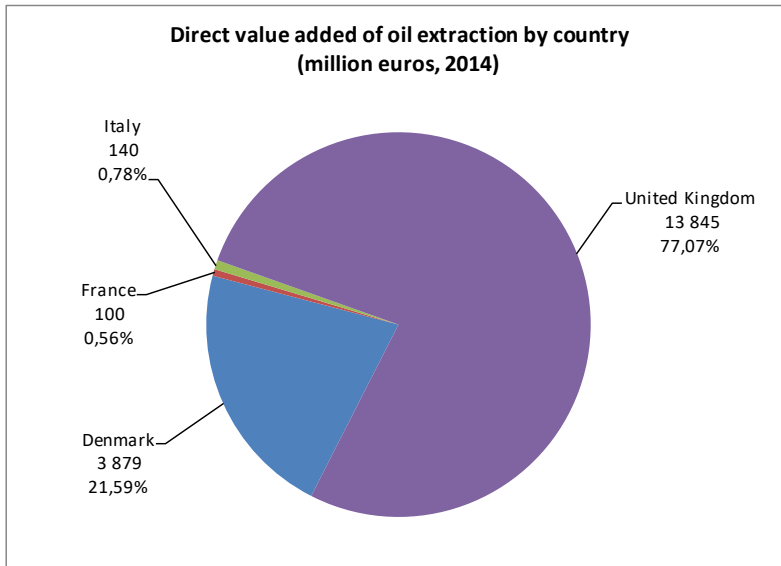
⁸ For more details on the activities making up the sector, please see Annex I § Error! Reference source not found..

Extraction of oil makes up about 77% of the total value added generated by the sector. Such a high share can be explained by the fact that the UK, the largest oil producer in the EU, mostly produces oil:

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Figure 6 – Direct value added of oil extraction by country, 2014



N.B. no data available for Romania on 2014.

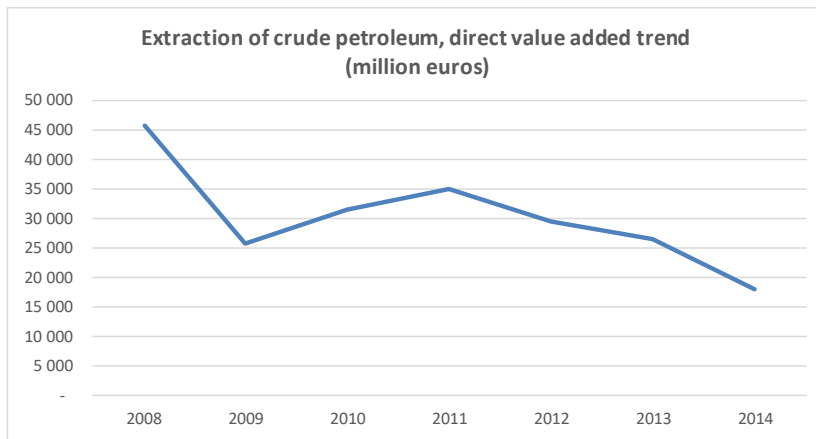
It should be mentioned that, for reasons such as low price and more sustainable alternatives, the oil sector is undergoing a difficult moment. The impact of low price is especially evident in the offshore industry, because offshore activities normally have higher costs.

Commented [C14]: Could you name some of them?

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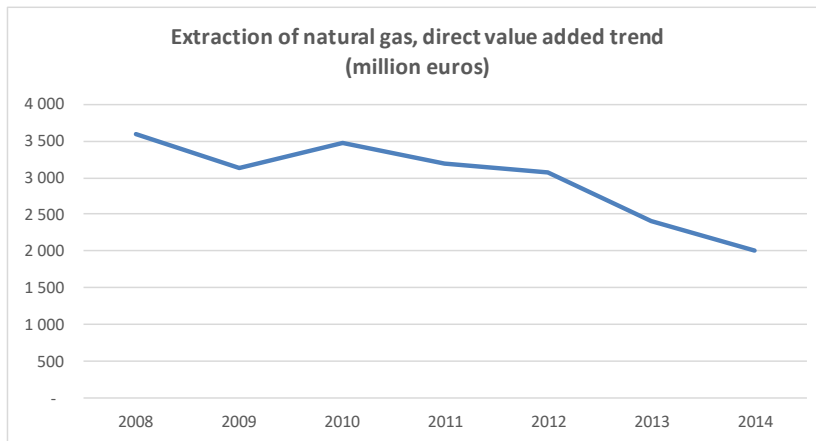
This is clear by looking at the GVA trend from 2008 to 2014:

Figure 7 – Extraction of crude petroleum, direct value added trend



There is a steep decline between 2008 and 2009 as a consequence of the economic crisis. Then the curve shows that the sector was slowly recovering, although it started to decline again in 2012. A similar trend was experienced in extraction of natural gas:

Figure 8 - Extraction of natural gas, direct value added trend

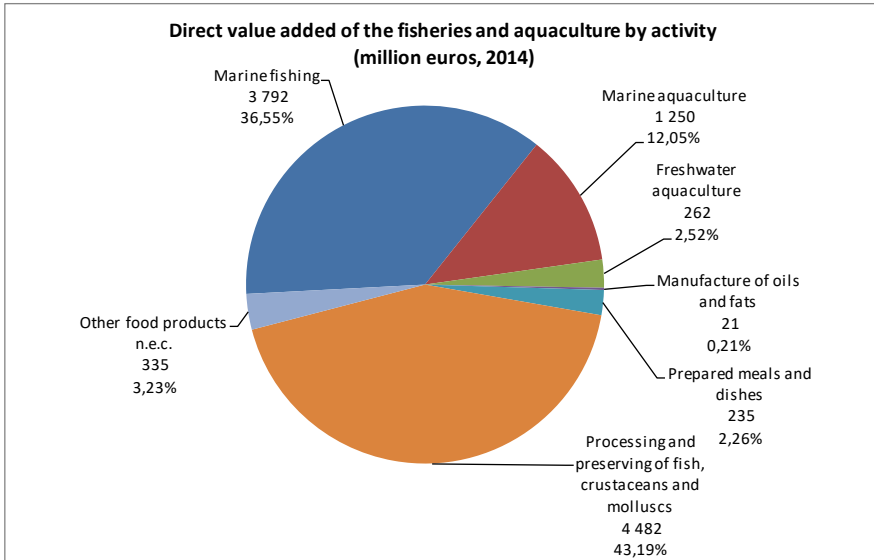


Fisheries and aquaculture⁹ is another sector which is interesting to look at. It is actually made up of several activities:

Commented [C16]: Please rephrase and explain where those activities come from or include a reference to the section where it is explained i.e. annex etc...

⁹ For more details on the activities making up the sector, please see Annex I § **Error! Reference source not found..**

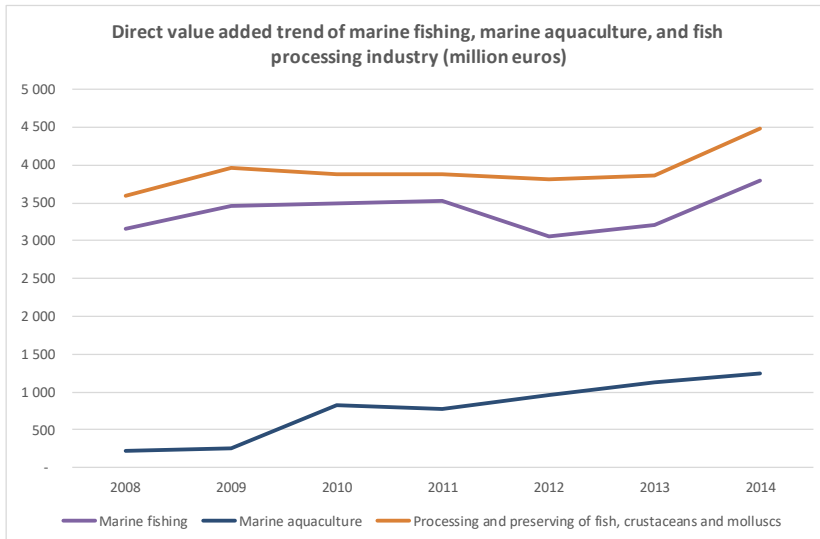
Figure 9 – Direct value added of the fisheries and aquaculture sector, 2014



The primary sector (marine fishing, marine aquaculture and freshwater aquaculture) makes up about 49% of value added, while the rest is generated by the processing industry, which however relies to a great extent on imported fish resources.

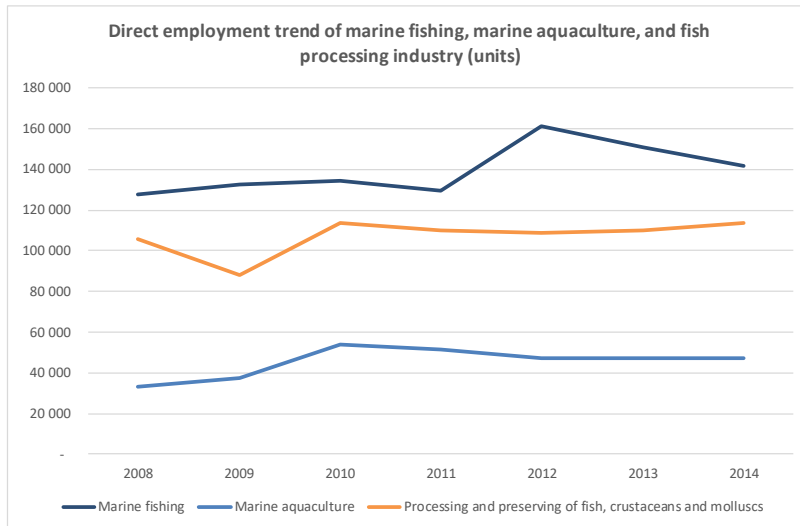
Marine fishing, marine aquaculture and the processing industry all increased in terms of direct value added between 2008 and 2014, despite the economic crisis:

Figure 10 – Direct value added trends of marine fishing, marine aquaculture, and fish processing industry



When it comes to the employment trend, the situation looks slightly different

Figure 11 – Direct employment trend of marine fishing, marine aquaculture and fish processing industry

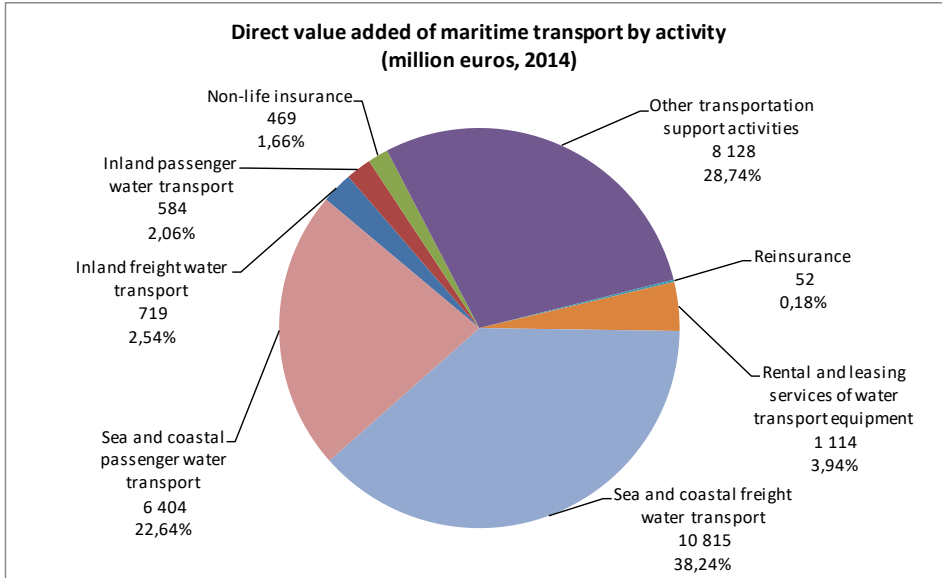


Data on 2014 are rather complete, but the same cannot be said for the rest of the time series. Some countries did not report data regularly, so harsh increases and decreases are due to one or more countries that started or stopped reporting (e.g. data employment in marine fishing in Greece are available only from 2012). In actuality, if all countries had reported data regularly, the curves would probably look flatter than they are, with a steady level of number of persons employed in these sectors, or in some cases a slight decline.

The pie chart below provides a breakdown by activity of maritime transport¹⁰ direct value added:

¹⁰ For more details on the activities making up the sector, please see Annex I § **Error! Reference source not found.**

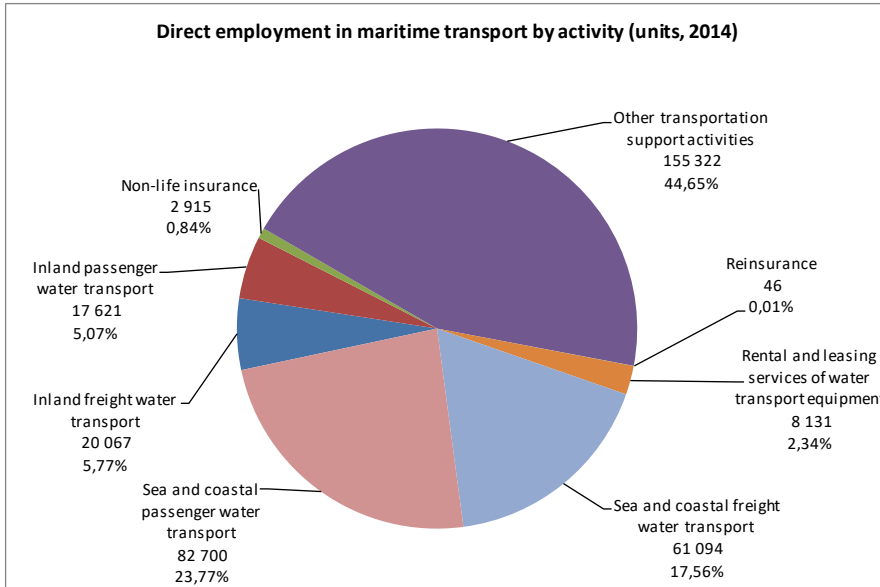
Figure 12 -- Direct value added of maritime transport, 2014



38% of value added is generated by maritime freight transport, while maritime passenger transport (which includes part of cruise tourism) contributes to 23% of value added. Nearly 28% of GVA is generated by 'other transportation support activities', a broad category that includes services such as forwarding of freight, arranging or organising of transport operations by rail, road, sea or air, organisation of group and individual consignments, issue and procurement of transport documents and waybills, activities of customs agents, activities of sea-freight forwarders and air-cargo agents, brokerage for ship and aircraft space, goods-handling operations.

In terms of employment, the situation is slightly different:

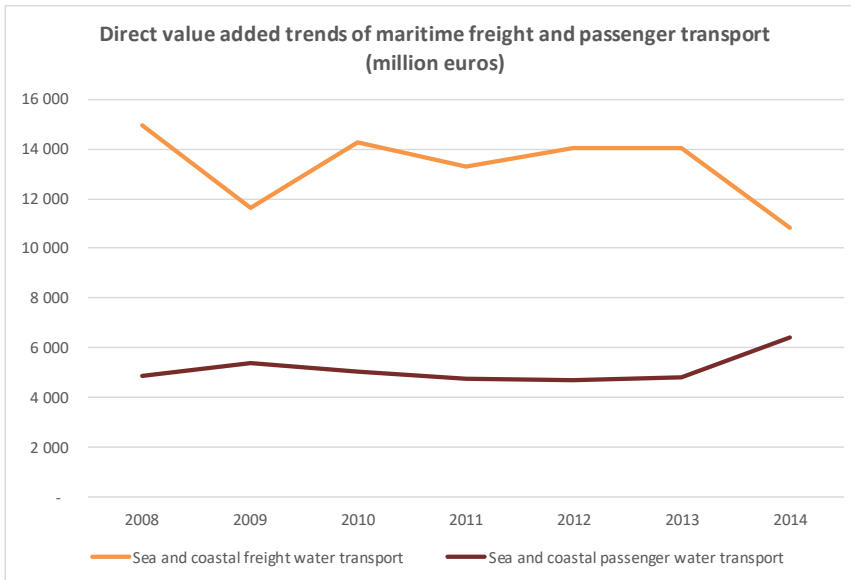
Figure 13 – Direct employment in maritime transport by activity, 2014



More than 40% of persons are employed in 'other transportation support activities', which alone almost equal the number of persons employed in maritime freight and passenger transport.

It may be interesting to look at the diverging trends between passenger and freight transport:

Figure 14 – Direct value added trends of maritime freight and passenger transport

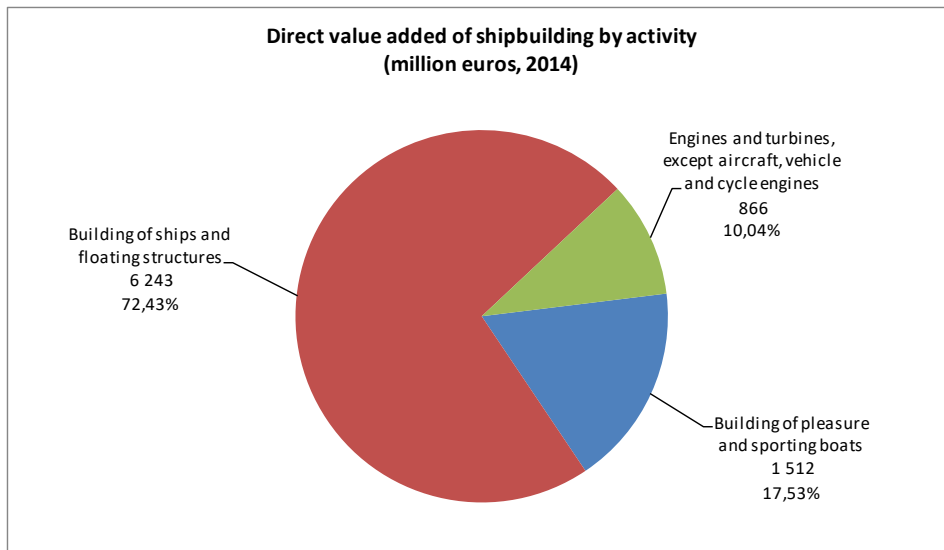


However, it should be noted that the decline of freight transport in 2014 may be attributed to missing data from Denmark. The data series also suffers from other gaps, but these are not as dramatic as to affect the trend at EU level.

Commented [S117]: Either it is or it isn't

When it comes to the shipbuilding sector¹¹, the data show that 72% of value added is generated by building of ships and floating structures:

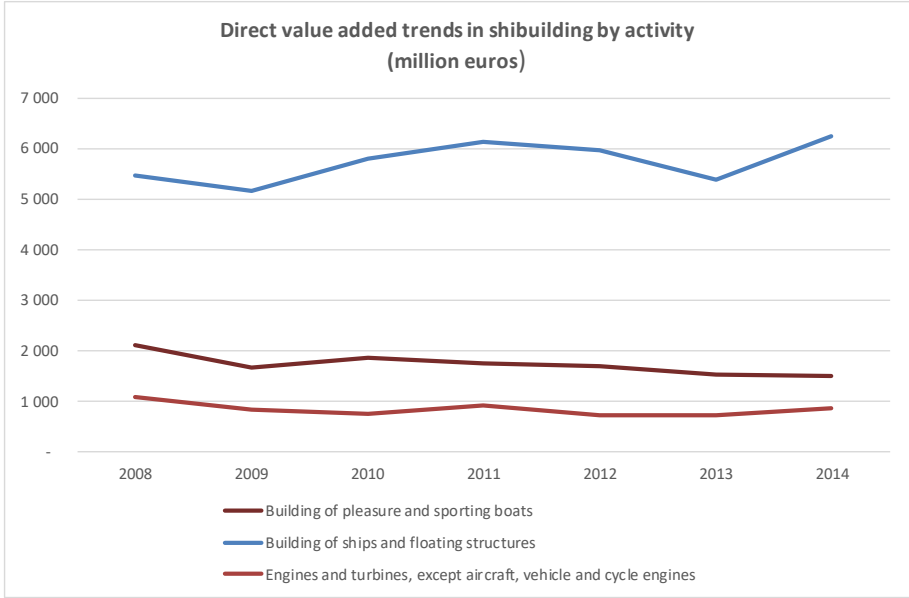
Figure 15 – Direct value added of shipbuilding by activity



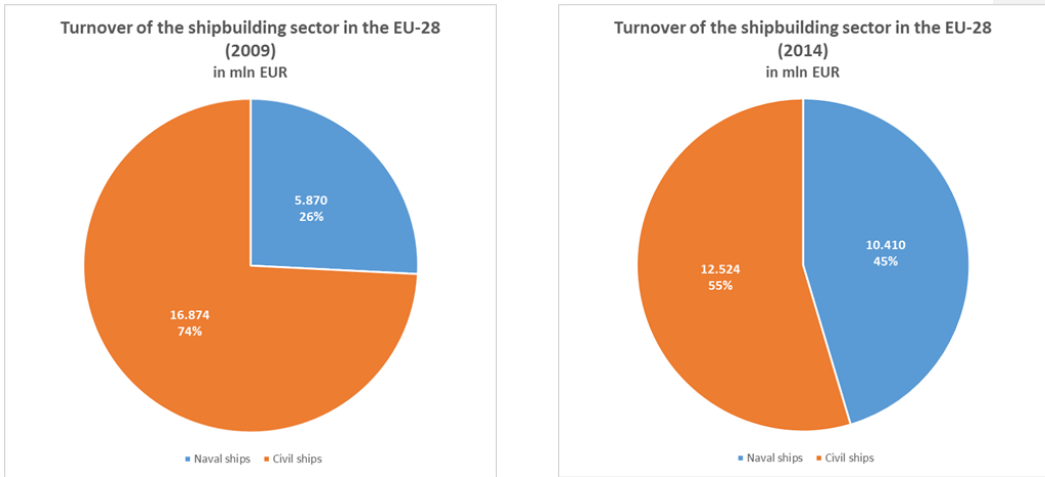
Building of pleasure and sporting boats probably tends to suffer more from the consequences of the economic crisis, as shown in the graphs below:

¹¹ For more details on the activities making up the sector, please see Annex I § Error! Reference source not found..

Figure 16 – Direct value added trends in shipbuilding



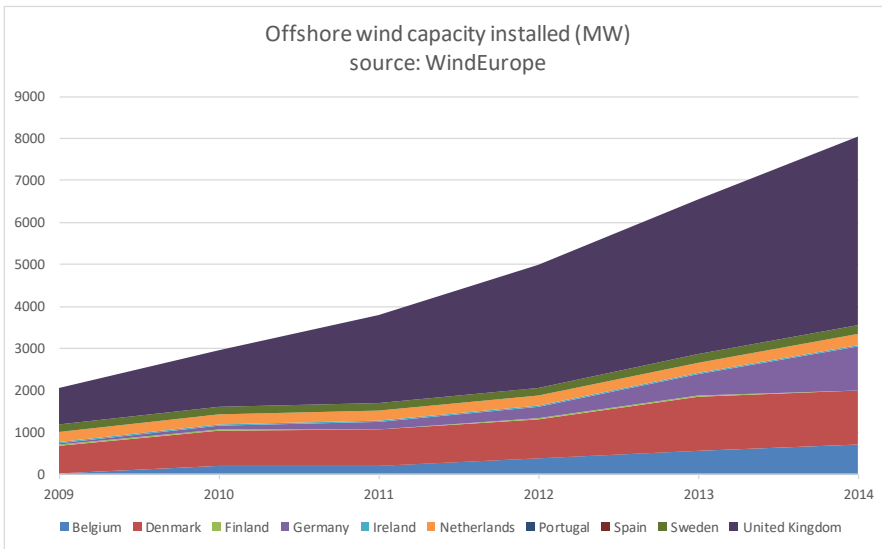
Ships and floating structures also include naval ships. The proportion between naval ships and civil ships cannot be inferred from Eurostat data. However, a sector-specific indicator has been developed based on data purchased from IHS – Jane’s Defence.



Source: own elaboration base on HIS – Jane’s Defence.

The share of naval ships increased considerably in the period between 2009 and 2014.

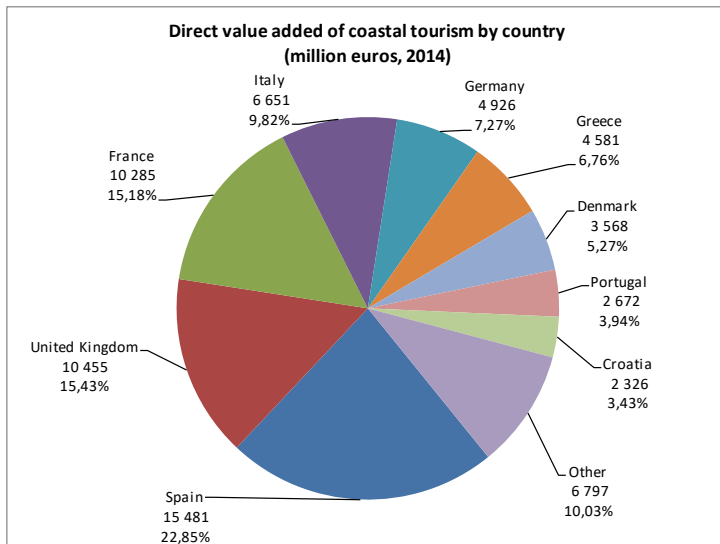
It may also be worth looking at what is happening in the wind energy sector. The sector is still small compared with the traditional industries, so rather than looking at absolute values, it may be interesting to understand what is happening in terms of installed capacity (which is one of the sector specific indicators):



The chart shows that the capacity installed increased considerably from 2009 to 2014. The sector has thus to be looked with great attention, as it clearly has great potential that can be further exploited.

The following graph shows the value added of coastal tourism in 2014 by country:

Figure 17 – Direct value added of coastal tourism by country



As one may expect, Spain ranks first. However, countries such as the UK, France and Germany ranks higher than other countries which would normally be perceived as tourist destinations. This is due to two factors:

1. Coastal tourism is defined as tourism in coastal areas, i.e. municipalities (LAU-2) bordering the sea and municipalities that have 50% of their territory within 10 km from the coast. Eurostat provides data on the number of nights spent in rented accommodation in coastal areas. A tourist is whoever goes to a destination other than their place of residence, whatever the purpose. The figures thus include business travellers and people who visit friends and relatives.
2. The size of coastal tourism has been estimated based on tourist spending in coastal areas. Tourist spending has been considered as 'turnover', while value added has been estimated based on the turnover/GVA ratio of the industries that make up coastal tourism. Coastal areas with a high cost of living are thus 'over-represented', even though the total number of nights spent by tourist is relatively low. This is made clearer by the graph below:

3 Description of main challenges encountered

Measuring the size of the blue economy is not a straightforward exercise. Generally speaking, the current classification system of economic activities does not take into account the maritime economy as such, hence several maritime sectors cannot be measured easily, either because of complete lack of data, or because several assumptions are required to produce an estimation.

Over the course of the study, the research team have had to deal with a number of challenges, some of which have been pointed out by and discussed with the numerous stakeholders consulted. It is paramount to report them, because, despite the effort put into the study, there are still obstacles that make it difficult to measure the whole blue economy, and will most certainly require further research in the coming years:

- **Timeliness of information:** generally speaking, statistical data on turnover, value added and employment are available two years after the year of reference. Such a time lag can be acceptable to analyse the past evolution of the blue economy and to identify historical trends, but many stakeholders pointed out that it may not be ideal for the industry, when it comes to making decisions that affect its business.
- **Not all Member States report their data to Eurostat with regularity:** this translates into a series of gaps in the time series, which can be observed in the database attached to this report. The result is that the size of the blue economy is inevitably underestimated, although most certainly not to an enormous extent. It should also be mentioned that, looking at the time series, it seems that for most sectors the situation has improved considerably in the last couple of years, compared to the first few years after the NACE classification was revised.
- **The current statistical classification system does not take into account the blue economy:** economic activities are currently classified according to their function rather than to where they take place, or which industry they serve. As a consequence, for many activities (among which are extraction of oil and gas, manufacturing of navigation equipment, extraction of aggregates, wind energy, blue biotechnology, etc.) it is not possible to know to what extent they contribute to the blue economy, unless strong assumptions are made. This situation calls for a revision of the current statistical classification system to better take into account the blue economy. However, revising a statistical classification is not an easy task, may take an extremely long time, and could also undermine accounting consistency, unless it is embraced worldwide.
- **Emerging activities are inherently more difficult to capture:** quite often emerging economic activities have not yet been included in the statistical classification system. Even when data are available through other sources (in this study it is the case of seabed mining, or desalination), the size of the sector could be so negligible that it would be impossible to make any reliable estimation. The approach adopted for this study has been to keep in the list emerging activities or activities for

which it is difficult to collect data, because in this way they may be included in the future, should their market grow to an appreciable size, or as new data sources become available.

- **Indirect impact of maritime activities:** economic data are collected to a higher level of detail by many Member States, but this level of detail is not continued in the production of supply and use tables (SUT). Only SUT published by Denmark and the UK provide more detailed sector differentiation, but these still do not enable other maritime sectors to be distinguished. However, additional data and information sources have been identified for all coastal Members States. These maritime-specific sources enable gaps in data to be filled, the corroboration of sector-based information and the ground-truthing of results.
- **Seabed mining:** there seems to be no extraction activity in Europe, and it is extremely difficult to measure the value added and the employment generated by exploration activities. Despite having good potential, the impact of seabed mining on the marine economy of the EU is probably negligible. Enquiries with private information providers have revealed that there are only 9 deep-sea mining vessels active in EU waters, and they only carry out research and exploration activities.
- **Non-commercial activities:** the size of these activities cannot be measured through data based on NACE. This makes data collection particularly challenging, as it is based entirely on reports and studies at the national level.
- **Will the blue economy embrace other activities in the future?** In a series of interviews with the members of the European Network of Maritime Clusters, it has emerged that it could be interesting to include maritime education as part of the blue economy. Unfortunately, there does not seem to be sufficient information at Member State level to have a clear picture of how much is spent on maritime education, how many people are working in the sector, and how many students are signing up. Another interesting point made regards ICT companies that locate their server farms near (or in) the ocean, to use the natural cooling power of water as well as wave and tidal energy. Such an activity would perfectly fit the definition of the blue economy developed for this study, as it takes place in the marine environment and uses sea resources.

4 Recommendations

One of the objectives of this study is to develop a set of recommendations as to how the framework for collecting data on the blue economy can be improved further in the future. In view of this, the research team has engaged in a consultation process that involved several stakeholders as well as a peer-review group of external experts from industry and academia alike.

The process culminated in a workshop that took place in Brussels in November 2016, during which the research team presented the preliminary results of the study, and elicited feedback from participants. A series of meetings were also organised with the European Network of Maritime Clusters, which shared their views on how the database could better serve the needs of the maritime industry.

Last but not least, a Steering Committee, made up of representatives of several DGs of the EU Commission also provided an invaluable contribution to the study.

Keep the database developed in this study up-to-date

Differently from previous attempts at measuring the size of the blue economy, this study was specifically conceived not to be a one-off exercise that merely returns a 'photograph' of the blue economy as it is at the time of writing. It is paramount to update the database every year as new data are made available. By doing so, it will be possible to build a consistent time series to keep track of the evolution of the blue economy over time.

Make the database public

Besides regular updates, several stakeholders have pointed out that it is important to ensure that the database is made available to the widest possible public, so that results and methods could be critically reviewed by stakeholders, even though, for various reasons, they have not been involved in the study. The yearly updates could be shared by DG MARE on the Maritime Forum in the form of Excel spreadsheets and Access tables. The findings of the study could also be highlighted through press releases or tweets from DG MARE account.

Set-up an interactive tool to query the data

At the same time, it should be noted that many users may not be familiar with spreadsheets and database tables, and for this reason could find it difficult to access the data. It has been suggested that in the future an interactive online tool could be developed to make sure that even non-experts are allowed to query the database. Special attention should be paid to ensure that the tool be as user-friendly as possible.

Complement the current framework based on statistical data with qualitative information

The framework developed for this study mainly relies on data available on Eurostat Structural Business Statistics. This approach has several advantages: it ensures accounting consistency, it delivers homogeneous and comparable data, and it is compatible with similar exercises carried out worldwide¹². However, the approach also has a number of disadvantages. Structural Business Statistics are normally available on Eurostat with a time lag of two years, and emerging activities are poorly covered. Several stakeholders suggested that it might be useful to complement the current framework based on quantitative data, with qualitative information collected through interviews with key industry players in each Member State. The qualitative information would not replace the current framework, but would rather complement it with 'market intelligence' that returns the 'sentiment' of the industry on certain economic trends.

Develop alternative methods to measure maritime activities that are not fully maritime

One of the disadvantages of the NACE classification is that activities are classified according to their economic nature, rather than on whether they are 'maritime'. As a consequence, for some sectors it is necessary to develop methods or use assumptions to determine how much of turnover, value added an employment can be attributed to the blue economy. However, the more assumptions are made, the less reliable the database becomes. Revising the NACE classification may not be feasible in the short run, hence a solution could be to develop a series of 'tags' that can be 'attached' to existing NACE codes, when data are collected or reported. The tags would consist of a self-reporting declaration from entrepreneurs in certain sectors that specifies how much of the turnover, value added an employment of their business is generated from activities that have a 'marine or maritime connotation'.

Encourage research on methods to measure emerging activities

Another disadvantage of the NACE classification is that it offers poor coverage of emerging sectors. The sectors that are currently not covered will probably be included in the next revisions of the classification, as their business grows to a more significant size. However, to cope with the lack of data in the meantime, a solution could be to carry out sector-specific studies that go beyond statistical data and collect new information from the industries concerned. Bespoke studies may improve data availability on a number of key sectors, among which are blue biotechnology, wind energy, dredging, desalination, etc. At the same time, these studies require the mobilisation of significant financial resources. Horizon 2020 calls could become a

¹² The Statistical Classification of Economic Activities in the European Union is the European implementation of the UN classification ISIC, revision 4 <http://unstats.un.org/unsd/cr/registry/isic-4.asp>

potential source of funding for this type of exercises. The call would set the general objectives to be achieved, but the exact methods would be developed with a bottom-up approach

Take into account ecosystem services

Ecosystem services are defined as the benefits that people obtain from ecosystems. This study does not deal with economic evaluation of ecosystem services, because these are not strictly speaking economic activities. However, a more comprehensive approach to measuring the blue economy should also take into account the value generated by ecosystem services, because a healthier environment yields benefits to the society that can also be quantified in economic terms

Set up a permanent blue economy data expert group

One of the innovative elements of this study is to be found in the setting up of an external peer-review group that periodically reviewed the findings of the research team. The peer-review group was made up of experts from industry and academia alike, to make sure that the methods developed for the study were at the same time sound, realistic and pragmatic. It may be worth to set up a permanent expert group on blue economy data. The expert group should include representatives from every maritime sector to make sure that all economic activities are covered. Experts from several EU DGs may also contribute to focusing on different policy objectives, since the blue economy deals with a wide range of issues, not all of which are necessarily in the remit of DG MARE. An option could be to expand and keep active the Member States' Expert Group which met in Brussels in September 2015¹³. The group was set up by the EC to work on estimating the size and nature of the blue economy.

¹³ For further information, please see <https://webgate.ec.europa.eu/maritimeforum/en/node/3778>