



Studies to support the development of sea basin cooperation in the Mediterranean, Adriatic and Ionian, and Black Sea

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METHODOLOGY FOR IDENTIFYING AND ESTIMATING MARITIME ACTIVITIES USING NACE AND OTHER DATA

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0.SUMMARY TABLE

| Function | Maritime activity | Private (pr)/public-funded activity (pf) | Short description | allocation of NACE rev.2 / other classification | Main keys to allocation |
|--|--|--|--|---|--|
| 0. Other sectors | 0.1 Shipbuilding and ship repair | Pr | Building and repair of merchant vessels and leisure boats; building, repair and maintenance of floating structures | C 30.11 Building of ships and floating structures C 30.12 Building of pleasure and sporting boats C 33.15 Repair and maintenance of ships and boats | Totally allocated to 0.1 Shipbuilding and ship repair |
| | 0.2 Water projects | Pr/Pf | Construction of civil engineering projects both coastal and inland, as waterways, harbour and river works, marinas, locks, dykes and dams. | F 42.91 Construction of water projects | Totally allocated to 0.1 Water projects |
| 1. Maritime transport and shipbuilding | 1.1 Deep-sea shipping | Pr | International freight transport operated by large vessels on intercontinental routes (both liner or tramp services). | H 50.20 Sea and coastal freight water transport H 52.10 Warehousing and storage H 52.22 Service activities incidental to water transportation H 52.24 Cargo handling N 77.34 Renting and leasing of water transport equipment | - 50.20: allocated between 1.1 and 1.2; - 52.22 and 77.34: allocated according to the share of 1.1 on 1.1, 1.2, 1.3, 1.4 and 4.3. - 52.10 and 52.24: the maritime share only has been allocated according to the share of 1.1 on 1.1, 1.2, 1.3, 1.4 and 4.3 |
| | 1.2 Short-sea shipping (incl. Ro-Ro) | Pr | National or international freight transport over relatively short distances. Short-sea shipping in the EU takes place between EU ports and between EU and neighbouring countries (Med and Black Sea, Baltic and EEA countries) . Ro-Ro segment (ships for wheeled cargos) is also included | H 50.20 Sea and coastal freight water transport H 52.10 Warehousing and storage H 52.22 Service activities incidental to water transportation H 52.24 Cargo handling N 77.34 Renting and leasing of water transport equipment | - 50.20: allocated between 1.1 and 1.2; - 52.22 and 77.34: allocated according to the share of 1.2 on 1.1, 1.2, 1.3, 1.4 and 4.3. - 52.10 and 52.24: the maritime share only has been allocated according to the share of 1.2 on 1.1, 1.2, 1.3, 1.4 and 4.3. |
| | 1.3 Passenger ferry services | Pr | National or international transport of passengers on fixed routes. Often it is combined with Ro-Ro. | H 50.10 Sea and coastal passenger water transport H 52.10 Warehousing and storage H 52.22 Service activities incidental to water transportation H 52.24 Cargo handling N 77.34 Renting and leasing of water transport equipment | - 50.10: allocated between 1.3 and 4.3; - 52.22 and 77.34: allocated according to the share of 1.3 on 1.1, 1.2, 1.3, 1.4 and 4.3. - 52.10 and 52.24: the maritime share only has been allocated according to the share of 1.3 on 1.1, 1.2, 1.3, 1.4 and 4.3. |
| | 1.4 Inland waterway transport | Pr | Freight transport on inland waterways. | H 50.40 Inland freight water transport | - 50.40: totally allocated to 1.4; - 52.22 and 77.34: allocated according to the share of 1.4 on 1.1, 1.2, 1.3, 1.4 and 4.3. - 52.10 and 52.24: the maritime share only has been allocated according to the share of 1.4 on 1.1, 1.2, |

| Function | Maritime activity | Private (pr)/public-funded activity (pf) | Short description | allocation of NACE rev.2 / other classification | Main keys to allocation |
|--|--|--|---|--|---|
| | | | | | 1.3, 1.4 and 4.3. |
| 2. Food, nutrition, health and eco-system services | 2.1 Fish for human consumption | Pr | Catching, processing and selling (both wholesale and retail) of fishery products fit for human consumption | A 03.11 Marine fishing A 03.12 Freshwater fishing G 46.38 Wholesale of other food, including fish, crustaceans and molluscs G 47.23 Retail sale of fish, crustaceans and molluscs in specialised stores G 47.11 Retail sale in non-specialised stores with food, beverages or tobacco predominating C 10.20 Fish processing | - 03.11 and 03.12: only the share for human consumption has been allocated; - 46.38 and 47.32: totally allocated to fish for human consumption; - 47.11: only the share of fish has been allocated to 2.1; - 10.20: only the share for human consumption has been allocated to 2.1 |
| | 2.2 Fish for animal feeding | Pr | Catching and processing of fishery products unfit for human consumption and used for animal feeding and agriculture | A 03.11 Marine fishing A 03.12 Freshwater fishing C 10.20 Fish processing | 03.11, 03.12 and 10.20: only the share for non food use has been allocated to 2.2 |
| | 2.3 Marine aquaculture | Pr | Farming of aquatic organism in marine and brackish water, mainly for human consumption | A 03.21 Marine aquaculture | Totally allocated to 2.3 |
| | 2.4 Blue biotechnology | Pr | All possible technology applications to marine living organisms, including food, nutrition, health, environment enhancement, but also cosmetics, processing technologies, industrial applications, energy production. | It is not possible to allocate to any NACE or other classifications | |
| | 2.5 Agriculture on saline soils | Pr | Agriculture on saline, sodic and potentially salt affected soils | 20000 GVA of agriculture and farming LFR_PERS Total number of persons employed as Regular Labour force | Allocated to 2.5 according the % of agriculture surfaces on saline soil on the total agricultural area at NUTS 2 level . |
| 3. Energy and raw materials | 3.1 Offshore oil and gas | Pr | Extraction of marine fossil fuels from offshore fields. Support activities for offshore extractions are also included | B 06.10 Extraction of crude petroleum B 06.20 Extraction of natural gas B 09.10 Support activities for petroleum and natural gas extraction | Totally allocated to 3.1 |
| | 3.2 Offshore wind | Pr | Exploitation of offshore wind energy for producing electricity | No correlation to any NACE | |
| | 3.3 Ocean renewable energy | Pr | Offshore exploitation of renewable energy resources (excluding wind) which includes: tides, waves, biomass, osmosis and ocean thermal energy conversion | No correlation to any NACE | |
| | 3.4 Carbon capture and storage | Pr | Capture, transport and storage of CO2 originating from large fuel power plants and depositing it in underground geological formations. | No correlation to any NACE | |
| | 3.5 Aggregates mining (sand, gravel, etc.) | Pr | Extraction of marine aggregates (sands and gravels) from the seabed | B 08.12 Operation of gravel and sand pits; mining of clays and kaolin B 09.90 Supporting activities for other mining and quarrying | Allocated according to the quantity of marine aggregates extracted in each Country |
| | 3.6 Marine minerals mining | Pr | Deep-sea mining of minerals such as polymetallic nodules, manganese crusts and sulfide deposits | No correlation to any NACE | |
| | 3.7 Securing fresh water | Pr | Desalination of sea water for fresh water usage | E 36.00 Water collection, treatment and supply | Allocated to 3.7 according to the share of seawater and |

| Function | Maritime activity | Private (pr)/public-funded activity (pf) | Short description | allocation of NACE rev.2 / other classification | Main keys to allocation |
|---|--|--|---|---|--|
| | supply (desalination) | | (agriculture and consumption) | | brackish water desalination on the total expenditure for water collection, treatment and supply |
| 4. Leisure, working and living | 4.1 Coastal tourism | Pr | Tourist and recreational economic activities related to the sea and located in coastal areas | I 55.10 Hotels and similar accommodation I 55.20 Holiday and other short-stay accommodation I 55.30 Camping grounds, recreational vehicle parks and trailer parks I 55.90 Other accommodation | 55.10, 55.20, 55.30 and 55.90: allocated to MEA 4.1 according to the share of nights spent in coastal NUTS 3 |
| | 4.2 Yachting and marinas | Pr | Services related to recreational shipping (yachting, sailing, etc.) and marinas related services | No correlation to any NACE | |
| | 4.3 Cruise tourism | Pr | It is a form of travelling, involving an all-inclusive holiday on a cruise ship according to a specific itinerary in which the ship calls at different ports. | H 50.10 Sea and coastal passenger water transport H 52.10 Warehousing and storage H 52.22 Service activities incidental to water transportation H 52.24 Cargo handling N 77.34 Renting and leasing of water transport equipment | - 50.10: allocated between 1.3 and 4.3; - 52.22 and 77.34: allocated according to the share of 4.3 on 1.1, 1.2, 1.3, 1.4 and 4.3. - 52.10 and 52.24: the maritime share only has been allocated according to the share of 4.3 on 1.1, 1.2, 1.3, 1.4 and 4.3. |
| | 4.4 Working | Not applicable | | | |
| | 4.5 Living | Not applicable | | | |
| 5. Coastal protection | 5.1 Protection against flooding and erosion | pf | Monitoring, maintaining and protecting coasts against flooding and erosions | GF05 Environmental protection (COFOG) | Public expenditure partially allocated to MEA 5.1 according to the share of annual expenditure in coastal protection over the total environmental protection (EUROSTAT COFOG) |
| | 5.2 Preventing salt water intrusion | pf | Adoption of measures focused at preventing salt water intrusion into freshwater aquifers | No correlation to any NACE | |
| | 5.3 Protection of habitats | pf | Protection of natural habitats in coastal areas (excluding marine protected areas) | GF0504 Protection of biodiversity and landscape (COFOG) | Public expenditure partially allocated to MEA 5,3 according to the % of regional/national coastal internal protected area over the total regional/national internal protected area |
| 6. Maritime monitoring and surveillance | 6.1 Traceability and security of goods supply chains | Pf | Organizations, systems, practices, equipments and services used for surveillance (security and safety) purposes in the field of maritime transportation | No correlation to any NACE | |
| | 6.2 Prevent and protect against illegal movement of people and goods | Pf | Monitoring and surveillance of the coastal borders using a variety of services, technologies and dedicated equipment for preventing against illegal movements of goods and people | No correlation to any NACE | |
| | 6.3 Environmental monitoring | Pf | Monitoring of environmental assets | No correlation to any NACE | |

1. Other sectors

1.1 Shipbuilding and ship repair

➔ Identification of the sectors

The following codes (NACE Rev. 2) are proposed to be included in the shipbuilding sector:

| | NACE rev. 1.1 | NACE rev. 2 |
|---------------------|--|--|
| Shipbuilding | 35.1 Building and repairing of ships and boats | 30.11 Building of ships and boats 33.15 Repair and maintenance of ships and boats |
| | | 30.12 Building of pleasure and sporting boats |

NACE rev. 2 “38.31 Dismantling of wrecks” is not included here since it includes all types of wrecks (cars, computers, televisions etc.) and given that dismantling of ships basically takes places outside the EU, it is proposed not to include this item.

➔ Data availability

These data are available in EUROSTAT at the following links:

| | code | Descr | EUROSTAT position |
|--------------|---------|---|----------------------|
| Shipbuilding | C 30.11 | Building of ships and boats | Link |
| | C 33.15 | Repair and maintenance of ships and boats | |
| | C 30.12 | Building of pleasure and sporting boats | |

➔ Methodology for managing data

No specific data management procedure is requested. GVA and Number of persons employed of “Shipbuilding and ship repair” will be reported as the sum of these 2 NACE codes.

➔ Key to allocate to different sea basins

For the purpose of our analysis, it is needed to split shipbuilding activities by sea basin for Spain, France, Germany, Denmark and UK.

This task will be carried out by Country experts, which will allocate GVA and number of persons employed according to the number of **shipbuilding yards located in the related sea basin**.

1.2 Construction of water projects

➔ Identification of the sector

For this sector, a specific NACE code is available in the classification:

| | NACE rev. 1.1 | NACE rev. 2 |
|-----------------------|--------------------------------------|--------------------------------------|
| Water projects | 45.24 Construction of water projects | 42.91 Construction of water projects |

It includes the construction of waterways, harbour and river works, pleasure ports (marinas), dams and dykes. Also activities such as dredging of waterways are included. These can be relevant to a multitude of MEAs.

➔ Data availability

| | Code (rev. 2) | Descr | EUROSTAT position |
|----------------|---------------|--------------------------------|----------------------|
| Water projects | F42.91 | Construction of water projects | Link |

➔ Methodology for managing data

No specific procedure for managing data is needed.

➔ Key to allocate to different sea basins

This NACE code is not available at NUTS 2 level in EUROSTAT. For allocating this item to different sea basins, the contribution of the Country expert is needed, which should explore the availability of this information in National statistics for France, Spain, Germany, Denmark and UK.

2. Maritime transport

2.1 Deep-sea shipping

2.2 Short-sea shipping (incl. Ro-Ro)

2.3 Passenger ferry services

2.4 Inland waterway transport

➔ Identification of the sectors of the sub-function's value chain

Contrary to NACE rev 1.1 (used by ECORYS) and according to NACE rev. 2, these four activities and their related value chains can be associated to sectors as follows:

| Sub-functions | NACE rev. 2 |
|----------------------------------|---|
| Deep-sea shipping | 50.20 Sea and coastal freight water transport |
| Short-sea shipping | |
| Passenger ferry services | 50.10 Sea and coastal passenger water transport |
| Inland waterway transport | 50.40 Inland freight water transport |

It has to be taken into account that NACE 50.10 "Sea and coastal passenger water transport" encompasses both passenger ferry services and cruise passenger. In the following section, a specific methodology for deducing cruise from this NACE is described.

On the other hand, this only covers a part of the value chain, as activities such as "shipbuilding" and "port services", should also be included.

Since shipbuilding will be dealt as a separate activity, only port services will be taken into account in this computation.

Therefore, we assume that deep-sea, short-sea and passenger ferry services will be considered as "water transport". The following correlation between sub-functions and NACE activities (both rev. 1.1 and rev 2) is proposed:

Table 1 - Water transport : Identification of the sector (1)

| | Sub-functions | NACE rev. 1.1 | NACE rev. 2 |
|-----------------|---------------------------------|---------------------------------------|---|
| WATER TRANSPORT | <u>Deep-sea shipping</u> | | 50.20 Sea and coastal freight water transport |
| | <u>Short-sea shipping</u> | 61.10 Sea and coastal water transport | 50.10 Sea and coastal passenger water transport |
| | <u>Passenger ferry services</u> | | |
| | <u>Inland water transport</u> | 61.20 Inland water transport | 50.40 Inland freight water transport |

Besides the items reported above used by ECORYS, according to IFREMER-EUROSTAT study¹, it is proposed to add the following items:

Table 2 - Water transport : Identification of the sector (2)

| | Sub-functions | NACE rev. 1.1 | NACE rev. 2 |
|-----------------|---------------------------------------|--|--|
| WATER TRANSPORT | <u>Deep-sea shipping</u> | | |
| | <u>Short-sea shipping</u> | 71.22 Renting of water transport equipment | 77.34 Renting and leasing of water transport equipment |
| | <u>Passenger ferry services</u> | | |
| | <u>Inland freight water transport</u> | | |

“Port services” should be added to these activities. Contrarily to ECORYS’ methodology, it is proposed to add NACE rev. 2 “52.22 **Service activities incidental to water transportation**”. Since this NACE code encompasses services to cruise as well as to other ships, it is proposed to break this code down between cruise and all other ships as described in detail in the following section.

Specifically as regards “52.24 **Cargo handling**” and “52.10 **Warehousing and storage**”, given that these covers also other non-maritime sectors, Country experts should identify at Country level the share of maritime activities. This information is available at Country level (e.g. for Italy 50% of Cargo handling relates to maritime aspects and the same percentage can be applied to “warehousing and storage”). If this information is not available in the related Country, the Country experts should assess the share of cargo handling and warehousing to be allocated to maritime. Only this share will be taken into account in the final computation.

Finally, the following correlation between sub-functions and NACE activities (both rev. 1.1 and rev 2) is proposed:

¹ Study in the field of maritime policy “Approach towards an Integrated Maritime Policy Database”

Table 3 - Port services : Identification of the sectors

| | NACE rev. 1.1 | NACE rev. 2 |
|---------------|--|---|
| Port services | 63.22 Other supporting water transport activities related to water transport of passengers, animals or freight | 52.22 Service activities incidental to water transportation activities related to water transport of passengers, animals or freight |
| | 63.11 Cargo handling | 52.24 Cargo handling |
| | 63.12 Storage and warehousing | 52.10 Warehousing and storage |

➔ Data availability

All data are available in EUROSTAT database (Structural Business Statistics). Basic data needed which should be downloaded for the purpose of our analysis are:

- Number of persons employed
- Value added at factor costs

In the table below you will find all NACE activities needed for building the analysis. In the last column, you will also find bookmarks of queries already set up in EUROSTAT. All variables have been selected, you only need to change the geographic parameter, according to your use.

Table 4 - Summary of NACE to be used for the analysis

| | code | Descr | Comments | EUROSTAT position |
|-----------------|---------|---|--|----------------------|
| Water transport | H 50.20 | Sea and coastal freight water transport | This code will be totally allocated to water transport | Link |
| | H 5010 | Sea and coastal passenger water transport | Shares of passenger ferry services and cruise needs to be calculated | |
| | H 5040 | Inland freight water transport | | |
| | N 77.34 | Renting and leasing of water transport equipment | This code will be split between 1.1, 1.2, 1.3, 1.4 and 4.3 | |
| Port services | H 52.24 | Cargo handling | Only the maritime activities should be included in the computation. % shares related to maritime activities should be identified by Country experts at Country level | Link |
| | H 52.10 | Warehousing and storage | | |
| | H 52.22 | Service activities incidental to water transportation | | |

➔ Methodology for managing data

✓ [STEP 1](#)

In line with Table 4, “Number of persons employed” and “Value added at factor costs” will be collected for all the items and summed up. By doing so, the exact sizes of (i) Deep-sea shipping, (ii) Short-sea shipping (incl. Ro-Ro), (iii) Passenger ferry services and (iv) inland water transport are calculated as a total, including also important transversal activities as “Port services”.

Of course, at present, only 3 years are available in EUROSTAT database, since NACE rev.2 has been adopted only in 2008.

Below an example for Italy is proposed:

Table 5 - Value added at factor costs- Example for Italy – million euros

| | NACE_R2 | NACE_R2(L)/TIME | 2008 | 2009 | 2010 | Comments |
|-----------------|---------|---|------------------|-----------------|------------------|---|
| Water transport | H5020 | Sea and coastal freight water transport | 1.470,60 | 735,2 | 2.052,10 | |
| | H5010 | Sea and coastal passenger water transport | 1.576,90 | 1.838,70 | 1.544,70 | Total (also including cruise) |
| | H5040 | Inland water transport | 20,4 | 16,8 | 24 | |
| | N7734 | Renting and leasing of water transport equipment | 14,1 | 44,3 | 113,3 | Total (also including cruise) |
| Port services | H5222 | Service activities incidental to water transportation | 814 | 780,1 | 885,1 | Total (also including cruise) |
| | H5224 | Cargo handling | 3.045,00 | 2.910,00 | 3.392,20 | Total, including also other non-maritime activities |
| | H5210 | Warehousing and storage | 1.186,30 | 1.092,60 | 1.302,50 | Total, including also other non-maritime activities |
| TOTAL | | | 10.609,60 | 9.095,90 | 10.783,50 | |

Table 6 - Number of persons employed - Example for Italy –units

| | NACE_R2 | NACE_R2(L)/TIME | 2008 | 2009 | 2010 | Comments |
|-----------------|---------|---|----------------|----------------|----------------|---|
| Water transport | H5020 | Sea and coastal freight water transport | 11.556 | 11.870 | 12.887 | |
| | H5010 | Sea and coastal passenger water transport | 13.548 | 16.837 | 14.341 | Total (also including cruise) |
| | H5040 | Inland water transport | 615 | 558 | 591 | |
| | N7734 | Renting and leasing of water transport equipment | 2.954 | 2.701 | 2.601 | Total (also including cruise) |
| Port services | H5222 | Service activities incidental to water transportation | 12.806 | 12.953 | 12.967 | Total (also including cruise) |
| | H5224 | Cargo handling | 140.810 | 125.251 | 125.085 | Total, including also other non-maritime activities |
| | H5210 | Warehousing and storage | 23.170 | 22.453 | 18.797 | Total, including also other non-maritime activities |
| TOTAL | | | 252.507 | 235.524 | 226.286 | |

✓ STEP 2

This task will split “Sea and coastal freight water transport” in “Deep-sea shipping” (DSS) and “short-sea shipping” (SSS). Of course, number of persons employed and value added are not available for DSS and SSS, but EUROSTAT provides freight volumes (gross weight) for both.

Table 7 - Shares of different transport modalities (Example for Italy)

| PAR_MAR/TIME | 2008 | 2009 | 2010 | |
|--------------------|-------|-------|-------|----------------------|
| Short Sea Shipping | 75,2% | 78,6% | 76,9% | Link |
| Deep Sea Shipping | 22,5% | 20,5% | 22,2% | |
| Unknown | 2,3% | 0,9% | 0,9% | |

N.B. the item “Unknown” stays for “other seaborne cargo”, which will be added to “Deep-sea shipping”. Only for Cyprus, where “unknown” is around 60%, these figures need to be checked at MS level.

Table 8 - Shares of different transport modalities 2 (Example for Italy)

| PAR_MAR/TIME | 2008 | 2009 | 2010 |
|--------------------|-------|-------|-------|
| Short Sea Shipping | 75,2% | 78,6% | 76,9% |
| Deep Sea Shipping | 24,8% | 21,4% | 23,1% |

✓ STEP 3

Resulting percentages will be applied to GVA and Number of persons employed of NACE H5020 “Sea and coastal freight water transport”, as follows:

Table 9 – GVA: Allocation of 50.20 to Short Sea shipping and Deep Sea Shipping for 2008 - 2009 - 2010 (Example for Italy) - million euro

| | 2008 | | 2009 | | 2010 | |
|--|----------------|---------------|----------------|--------------|----------------|---------------|
| | % | GVA | % | GVA | % | GVA |
| Short Sea Shipping | 75,20% | 1105,89 | 78,60% | 577,87 | 76,90% | 1578,06 |
| Deep Sea Shipping | 24,80% | 364,71 | 21,40% | 157,33 | 23,10% | 474,04 |
| Sea and coastal freight water transport | 100,00% | 1470,6 | 100,00% | 735,2 | 100,00% | 2052,1 |

Table 10 – NUMBER OF PERSONS EMPLOYED: Allocation of 50.20 to Short Sea shipping and Deep Sea Shipping for 2008 - 2009 - 2010 (Example for Italy) - units

| | 2008 | | 2009 | | 2010 | |
|--|-----------------|----------------------------|-----------------|----------------------------|-----------------|----------------------------|
| | % | Number of persons employed | % | Number of persons employed | % | Number of persons employed |
| Short Sea Shipping | 75,20 % | 8.690,11 | 78,60 % | 9.329,82 | 76,90 % | 9.910,10 |
| Deep Sea Shipping | 24,80 % | 2.865,89 | 21,40 % | 2.540,18 | 23,10 % | 2.976,90 |
| Sea and coastal freight water transport | 100,00 % | 11.556,00 | 100,00 % | 11.870,00 | 100,00 % | 12.887 |

These are not final figures for Deep sea and short sea shipping, since also “Port services” activities should be added.

✓ STEP 4

5 sectors need to be managed in order to achieve only needed figures, namely:

- A. Sea and coastal passenger water transport (50.10)
- B. Service activities incidental to water transportation (52.22)
- C. Renting and leasing of water transport equipment
- D. Cargo handling (52.24)
- E. Warehousing and storage (52.10)

A. Sea and coastal passenger water transport (50.10)

Since this item includes also cruise passenger transport, we need to deduce this share. The share of passenger ferry services will be deducted by using the number of passengers statistics available in EUROSTAT (last year available will be taken into account). Table below provides example for Italy:

| Descr | Comments | 1.000 passenger | % share | EUROSTAT position |
|---|------------------|-----------------|---------|----------------------|
| Passengers (excluding cruise passengers) transported to/from main ports | Excluding cruise | 40.998 | 50% | Link |
| Country level - Passengers embarked and disembarked in all ports | Ferry + cruise | 81.895 | 100% | Link |

Therefore 50% of GVA and Number of persons employed of 50.10 will be allocated to passenger ferry services. Remaining 50% will be allocated to cruise (sub-function 4.3)

B. Service activities incidental to water transportation (52.22)

This sector is deemed relevant to 1.1, 1.2, 1.3, 1.4 and 4.3. Therefore it needs to be split:

- Proposed first to split between passenger (including cruise), freight and inland using the value added. Tables below specifies % shares which will be used

Table 11 - Value added shares - Italy - million of euros

| NACE_R2 | NACE_R2(L)/TIME | 2008 | % shares | 2009 | % shares | 2010 | % shares | Comments |
|---------|---|----------|----------|----------|----------|----------|----------|-------------------------------|
| H5020 | Sea and coastal freight water transport | 1.470,60 | 48% | 735,2 | 28% | 2.052,10 | 57% | |
| H5010 | Sea and coastal passenger water transport | 1.576,90 | 51% | 1.838,70 | 71% | 1.544,70 | 43% | Total (also including cruise) |
| H5040 | Inland water transport | 20,4 | 1% | 16,8 | 1% | 24 | 1% | |
| TOTAL | | 3.067,90 | 100% | 2.590,70 | 100% | 3.620,80 | 100% | |

Table 12 - Number of persons employed shares - Italy - unit

| NACE_R2 | NACE_R2(L)/TIME | 2008 | % shares | 2009 | % shares | 2010 | % shares | Comments |
|---------|---|-----------|----------|-----------|----------|-----------|----------|-------------------------------|
| H5020 | Sea and coastal freight water transport | 11.556 | 45% | 11.870 | 41% | 12.887 | 46% | |
| H5010 | Sea and coastal passenger water transport | 13.548 | 53% | 16.837 | 58% | 14.341 | 52% | Total (also including cruise) |
| H5040 | Inland water transport | 615 | 2% | 558 | 2% | 591 | 2% | |
| TOTAL | | 25.719,00 | 100% | 29.265,00 | 100% | 27.819,00 | 100% | |

- Therefore, these % shares will be applied to 52.22 code

Table 13 – VALUE ADDED: Allocation of 52.22 to 50.10 (including cruise), 50.20 and 50.40

| NACE | Descr | Allocation to | 2008 | 2009 | 2010 |
|-------|---|--|---------------|---------------|---------------|
| 52.22 | Service activities incidental to water transportation | 50.20 Sea and coastal freight water transport | 390,72 | 218,43 | 504,51 |
| | | 50.10 Sea and coastal passenger water transport | 415,14 | 553,87 | 380,59 |
| | | 50.40 Inland water transport | 8,14 | 7,80 | 8,85 |
| | | TOTAL | 814,00 | 780,10 | 893,95 |

Table 14 - NUMBER OF PERSONS EMPLOYED - Allocation of 52.22 to 50.10 (including cruise), 50.20 and 50.40

| NACE | Descr | Allocation to | 2008 | 2009 | 2010 |
|-------|---|--|------------------|------------------|------------------|
| 52.22 | Service activities incidental to water transportation | 50.20 Sea and coastal freight water transport | 5.762,70 | 5.253,79 | 5.964,82 |
| | | 50.10 Sea and coastal passenger water transport | 6.787,18 | 7.452,24 | 6.742,84 |
| | | 50.40 Inland water transport | 256,12 | 246,98 | 259,34 |
| | | TOTAL | 12.806,00 | 12.953,00 | 12.967,00 |

The share of Inland water transport directly will be aggregated to the related MEA 1.4 Inland waterway transport.

- Then within freight split on the basis of cargo (as in STEP 3 above)

Table 15 - VALUE ADDED: allocation of 50.20 (referred to 52.22) to Deepsea and Shortsea shipping - million of euros - example of Italy

| NACE | Descr | Allocation to | 2008 | | 2009 | | 2010 | |
|-------|---|--|---------------|-------------|---------------|-------------|---------------|-------------|
| 52.22 | Service activities incidental to water transportation | Short sea shipping | 293,82 | 75% | 171,69 | 79% | 387,97 | 77% |
| | | Deep sea shipping | 96,90 | 25% | 46,74 | 21% | 116,54 | 23% |
| | | 50.20 Sea and coastal freight water transport | 390,72 | 100% | 218,43 | 100% | 504,51 | 100% |

Table 16 - NUMBER OF PERSONS EMPLOYED - allocation of 50.20 (referred to 52.22) to Deepsea and Shortsea shipping - UNIT - example of Italy

| NACE | Descr | Allocation to | 2008 | | 2009 | | 2010 | |
|-------|---|--|-----------------|-------------|-----------------|-------------|-----------------|-------------|
| 52.22 | Service activities incidental to water transportation | Short sea shipping | 4.333,55 | 75% | 4.174,23 | 79% | 4.586,95 | 77% |
| | | Deep sea shipping | 1.429,15 | 25% | 1.136,50 | 21% | 1.377,87 | 23% |
| | | 50.20 Sea and coastal freight water transport | 5.762,70 | 100% | 5.310,73 | 100% | 5.964,82 | 100% |

- And split passenger between ferries and cruise (as in step 4.A above)

Table 17 - VALUE ADDED: allocation of 50.10 (referred to 52.22) to Passenger ferry services and cruise tourism - million of euros - example of Italy

| NACE | Descr | Allocation to | 2008 | | 2009 | | 2010 | |
|-------|---|--|---------------|-------------|---------------|-------------|---------------|-------------|
| 52.22 | Service activities incidental to water transportation | Passenger ferry services | 207,57 | 50% | 276,94 | 50% | 190,30 | 50% |
| | | Cruise tourism | 207,57 | 50% | 276,94 | 50% | 190,30 | 50% |
| | | 50.10 Sea and coastal passenger water transport | 415,14 | 100% | 553,87 | 100% | 380,59 | 100% |

Table 18 - NUMBER OF PERSONS EMPLOYED: allocation of 50.10 (referred to 52.22) to Passenger ferry services and cruise tourism - UNIT- example of Italy

| NACE | Descr | Allocation to | 2008 | | 2009 | | 2010 | |
|-------|---|--|-----------------|-------------|-----------------|-------------|-----------------|-------------|
| 52.22 | Service activities incidental to water transportation | Passenger ferry services | 3.393,59 | 50% | 3.726,12 | 50% | 3.371,42 | 50% |
| | | Cruise tourism | 3.393,59 | 50% | 3.726,12 | 50% | 3.371,42 | 50% |
| | | 50.10 Sea and coastal passenger water transport | 6.787,18 | 100% | 7.452,24 | 100% | 6.742,84 | 100% |

N.B. These figures related to 52.22 **Service activities incidental to water transportation** will be added **at the end of the computation (STEP 5)**

C. Renting and leasing of water transport equipment (N 77.34)

The same methodology described for 52.22 above applies also for N 77.34.

N.B. These figures related to 77.34 **Renting and leasing of water transport equipment** will be added **at the end of the computation (STEP 5)**

D. Cargo handling (52.24)

E. Warehousing and storage (52.10)

These items need to be split between maritime and non-maritime. In Italy, 50% of cargo handling is linked to maritime activities (source: ISTAT). The same percentage will be applied to NACE 52.10.

For the maritime shares of these two items, the same methodology described for 52.22 above applies also for these 2

N.B. These figures related to 52.24 **Cargo handling** and 52.10 **Warehousing and storage** will be added **at the end of the computation (STEP 5)**

✓ **STEP 5**

The following table summarises the final figures of the (i) Deep-sea shipping; (ii) Short-sea shipping (incl. Ro-Ro) (iii) Passenger ferry services and (iv) Inland water transport:

Table 19 - GVA for Deep Sea Shipping, Short Sea shipping, Passenger ferry services and Inland water transport for 2008 - 2009 - 2010 (Example for Italy) - million euro

| MEA | MEA descr | NACE | 2008 | 2009 | 2010 | Comment |
|-----|----------------------------------|---|-----------------|-----------------|-----------------|---|
| 1.1 | Deep Sea Shipping | 50.20 Sea and coastal freight water transport | 1.470,60 | 735,2 | 474,04 | only the share related to deepsea shipping has been included |
| | | 52.22 Service activities incidental to water transportation | 96,90 | 46,74 | 116,54 | only the share related to deepsea shipping has been included |
| | | 77.34 Renting and leasing of water transport equipment | 1,69 | 2,60484 | 14,85 | only the share related to deepsea shipping has been included |
| | | 52.24 Cargo handling | 182,70 | 85,554 | 222,36 | The share related to maritime activities has been included and only related to deep sea shipping |
| | | 52.10 Warehousing and storage | 71,18 | 32,12244 | 85,38 | The share related to maritime activities has been included and only related to deep sea shipping |
| | | TOTAL | 1.823,07 | 902,22 | 2.491,23 | |
| 1.2 | Short Sea Shipping (incl. Ro-Ro) | 50.20 Sea and coastal freight water transport | 1.105,89 | 577,87 | 1.578,06 | only the share related to shortsea shipping has been included |
| | | 52.22 Service activities incidental to water transportation | 293,82 | 171,69 | 387,97 | only the share related to shortsea shipping has been included |
| | | 77.34 Renting and leasing of water transport equipment | 5,08 | 9,80 | 49,73 | only the share related to shortsea shipping has been included |
| | | 52.24 Cargo handling | 548,10 | 321,85 | 744,42 | The share related to maritime activities has been included and only related to shortsea shipping |
| | | 52.10 Warehousing and storage | 213,53 | 120,84 | 285,83 | The share related to maritime activities has been included and only related to shortsea shipping |
| | | TOTAL | 2.166,42 | 1.202,05 | 3.046,01 | |
| 1.3 | Passenger ferry services | 50.10 Sea and coastal passenger water transport | 788,45 | 919,35 | 772,35 | only the share related to ferry services has been included |
| | | 52.22 Service activities incidental to water transportation | 207,57 | 276,94 | 190,30 | only the share related to ferry services has been included |
| | | 77.34 Renting and leasing of water transport equipment | 3,60 | 15,73 | 24,36 | only the share related to ferry services has been included |
| | | 52.24 Cargo handling | 388,24 | 516,53 | 364,66 | The share related to maritime activities has been included and only related to passenger ferry services |
| | | 52.10 Warehousing and storage | 151,25 | 193,94 | 140,02 | The share related to maritime activities has been included and only related to passenger ferry services |
| | | TOTAL | 1.539,11 | 1.922,48 | 1.491,69 | |
| 1.4 | Inland waterway transport | 50.40 Inland water transport | 20,4 | 16,8 | 24 | the entire NACE code is reported |
| | | 52.22 Service activities incidental to water transportation | 8,14 | 7,80 | 8,85 | only the share related to Inland water transport has been included |
| | | 77.34 Renting and leasing of water transport equipment | 0,14 | 0,44 | 1,13 | only the share related to Inland water transport has been included |
| | | 52.24 Cargo handling | 15,23 | 14,55 | 16,96 | The share related to maritime activities has been included and only related to Inland water transport |
| | | 52.10 Warehousing and storage | 5,93 | 5,46 | 6,51 | The share related to maritime activities has been included and only related to Inland water transport |
| | | TOTAL | 49,84 | 45,06 | 57,46 | |

Table 20 – Number of persons employed for Deep Sea Shipping, Short Sea shipping and Passenger ferry services for 2008 - 2009 - 2010 (Example for Italy) - units

| MEA | MEA descr | NACE | 2008 | 2009 | 2010 | Comment |
|-----|-----------------------------------|---|------------------|------------------|------------------|---|
| 1.1 | Deep Sea Shipping | 50.20 Sea and coastal freight water transport | 2.865,89 | 2.540,18 | 2.976,90 | only the share related to deepsea shipping has been included |
| | | 52.22 Service activities incidental to water transportation | 1.429,15 | 1.136,50 | 1.377,87 | only the share related to deepsea shipping has been included |
| | | 77.34 Renting and leasing of water transport equipment | 332,33 | 232,5561 | 275,19 | only the share related to deepsea shipping has been included |
| | | 52.24 Cargo handling | 7.920,56 | 5392,05555 | 6.617,00 | The share related to maritime activities has been included and only related to deep sea shipping |
| | | 52.10 Warehousing and storage | 1.303,31 | 966,60165 | 994,36 | The share related to maritime activities has been included and only related to deep sea shipping |
| | | TOTAL | 13.851,24 | 10.267,89 | 12.241,31 | |
| 1.2 | Short Sea Shipping (incl. Ro-Ro)) | 50.20 Sea and coastal freight water transport | 8.690,11 | 9.329,82 | 9.910,10 | only the share related to shortsea shipping has been included |
| | | 52.22 Service activities incidental to water transportation | 4.333,55 | 4.174,23 | 4.586,95 | only the share related to shortsea shipping has been included |
| | | 77.34 Renting and leasing of water transport equipment | 996,98 | 874,85 | 921,27 | only the share related to shortsea shipping has been included |
| | | 52.24 Cargo handling | 23.761,69 | 20.284,40 | 22.152,55 | The share related to maritime activities has been included and only related to shortsea shipping |
| | | 52.10 Warehousing and storage | 3.909,94 | 3.636,26 | 3.328,95 | The share related to maritime activities has been included and only related to shortsea shipping |
| | | TOTAL | 41.692,26 | 38.299,57 | 40.899,83 | |
| 1.3 | Passenger ferry services | 50.10 Sea and coastal passenger water transport | 6.774,00 | 8.418,50 | 7.170,50 | only the share related to ferry services has been included |
| | | 52.22 Service activities incidental to water transportation | 3.393,59 | 3.726,12 | 3.371,42 | only the share related to ferry services has been included |
| | | 77.34 Renting and leasing of water transport equipment | 782,81 | 783,29 | 676,26 | only the share related to ferry services has been included |
| | | 52.24 Cargo handling | 18.657,33 | 18.161,40 | 16.261,05 | The share related to maritime activities has been included and only related to passenger ferry services |
| | | 52.10 Warehousing and storage | 3.070,03 | 3.255,69 | 2.443,61 | The share related to maritime activities has been included and only related to passenger ferry services |
| | | TOTAL | 32.677,75 | 34.344,99 | 29.922,84 | |
| 1.4 | Inland waterway transport | 50.40 Inland water transport | 615 | 558 | 591 | the entire NACE code is reported |
| | | 52.22 Service activities incidental to water transportation | 256,12 | 246,98 | 259,34 | only the share related to Inland water transport has been included |
| | | 77.34 Renting and leasing of water transport equipment | 59,08 | 54,02 | 52,02 | only the share related to Inland water transport has been included |
| | | 52.24 Cargo handling | 1.408,10 | 1.252,51 | 1.250,85 | The share related to maritime activities has been included and only related to Inland water transport |
| | | 52.10 Warehousing and storage | 231,70 | 224,53 | 187,97 | The share related to maritime activities has been included and only related to Inland water transport |
| | | TOTAL | 2.570,00 | 2.336,04 | 2.341,18 | |

➤ Key to allocate between sea basins

1.1 Deepsea shipping

1.2 Shortsea shipping

In order to allocate these 2 sub-functions to different sea basins for DK-DE-FR-ES-UK, it is proposed to calculate the weight of each maritime NUTS 2 over the national total in terms freight volumes. Data about maritime transport of freight by NUTS 2 regions are available in EUROSTAT ([Link](#), please select only the geographic parameter). Shares of each NUTS 2 will be applied to the national total (GVA and number of persons employed) of 1.1 and 1.2, previously calculated.

For the allocation of NUTS 2 to different sea basins, please see this [Link](#).

1.3 Passenger ferry services

The same approach proposed for 1.1 and 1.2 is proposed to be followed. Data by NUTS 2 are available at the following [Link](#) (only the geographic parameter needs to be selected). It has to be taken into account that passengers reported in this section regard only ferry services (excluding cruise tourism), despite it is not mentioned.

1.4 Inland waterway transport

The following allocation is proposed

- For Germany, 1.4 will be totally allocated to the North-sea;
- For UK it will be allocated to the North-sea.
- For France, Country experts will investigate national sources (i.e. Voies navigable de France, VNF) in order to achieve the share of different sea-basins. If no results can be obtained, 100% will be assigned to Northsea & English Channel;
- For Spain, it will be totally attributed to the Mediterranean.

3. Food, nutrition, health and eco-system services

3.1 Fish for human consumption

3.2 Fishing for animal feeding

➔ Identification of the sectors of the MEA's value chain

In each of these two MEA, according to the Blue Growth study methodology, 2 types of activities are included:

- Fishing activities
- Fish processing

Data available at EU level do not distinguish fishing activities between human consumption and non-food use, neither for fishing and processing.

Only for **fish processing** it is possible to estimate GVA and employment according to the two different uses of products (food use vs non-food use).

In order to split NACE rev. 2 code C 10.20 (Fish processing) in fit and unfit for human consumption, it is suggested to make use of Prodcom data for total value of sold production. In Prodcom statistics products are identified by an 8-digit code. Below are reported all relevant codes for processed fish production, divided between food use and non-food use. The first four digits are the classification of the producing enterprise given by the Statistical Classification of Economic Activities in the European Community (NACE) and the first six correspond to the CPA. The remaining digits specify the product in more detail.

Table 21 – List of PRODCOM processed fish

| | | |
|-----------------------------|---|--|
| fit for human consumption | 10201100 | Fresh or chilled fish fillets and other fish meat without bones |
| | 10201200 | Fresh or chilled fish livers and roes |
| | 10201330 | Frozen whole salt water fish |
| | 10201360 | Frozen whole fresh water fish |
| | 10201400 | Frozen fish fillets |
| | 10201500 | Frozen fish meat without bones (excluding fillets) |
| | 10201600 | Frozen fish livers and roes |
| | 10202100 | Fish fillets, dried, salted or in brine, but not smoked |
| | 10202200 | Flours, meals and pellets of fish, fit for human consumption; fish livers and roes, dried, smoked, salted or in brine |
| | 10202350 | Dried fish, whether or not salted; fish, salted but not dried; fish in brine (excluding fillets, smoked, heads, tails and maws) |
| | 10202425 | Smoked Pacific, Atlantic and Danube salmon (including fillets, excluding heads, tails and maws) |
| | 10202455 | Smoked herrings (including fillets, excluding heads, tails and maws) |
| | 10202485 | Smoked fish (excluding herrings, Pacific, Atlantic and Danube salmon), including fillets, excluding head, tails and maws |
| | 10202510 | Prepared or preserved salmon, whole or in pieces (excluding minced products and prepared meals and dishes) |
| | 10202520 | Prepared or preserved herrings, whole or in pieces (excluding minced products and prepared meals and dishes) |
| | 10202530 | Prepared or preserved sardines, sardinella, brisling and sprats, whole or in pieces (excluding minced products and prepared meals and dishes) |
| | 10202540 | Prepared or preserved tuna, skipjack and Atlantic bonito, whole or in pieces (excluding minced products and prepared meals and dishes) |
| | 10202550 | Prepared or preserved mackerel, whole or in pieces (excluding minced products and prepared meals and dishes) |
| | 10202560 | Prepared or preserved anchovies, whole or in pieces (excluding minced products and prepared meals and dishes) |
| | 10202570 | Fish fillets in batter or breadcrumbs including fish fingers (excluding prepared meals and dishes) |
| | 10202580 | Other prepared or preserved fish, whole or in pieces (excluding minced products and prepared meals and dishes) |
| | 10202590 | Prepared or preserved fish (excluding whole or in pieces and prepared meals and dishes) |
| | 10202630 | Caviar (sturgeon roe) |
| | 10202660 | Caviar substitutes |
| | 10203100 | Frozen crustaceans, frozen flours, meals and pellets of crustaceans, fit for human consumption |
| | 10203200 | Molluscs (scallops, mussels, cuttle fish, squid and octopus), frozen, dried, smoked, salted or in brine |
| | 10203400 | Prepared or preserved crustaceans, molluscs and other aquatic invertebrates (excluding chilled, frozen, dried, salted or in brine, crustaceans, in shell, cooked by steaming or boiling) (excluding prepared meals and dishes) |
| | 10204250 | Fish heads, tails and maws, other edible fish offal: dried, salted or in brine, smoked |
| 10851200 | Prepared meals and dishes based on fish, crustaceans and molluscs | |
| unfit for human consumption | 10204100 | Flours, meals and pellets of fish or of crustaceans, molluscs or other aquatic invertebrates, unfit for human consumption |
| | 10204200 | Inedible fish products (including fish waste; excluding whalebone and whalebone hair, coral and similar materials, shells and cuttle-bone, unworked or simply prepared/natural sponges) |

Other codes related to fish processed products could be sorted out (e.g. 10411200 - Fats and oils and their fractions of fish or marine mammals) which could be allocated to non-food use products. Actually, this type of products are mainly used in the cosmetic and pharmaceutical sectors and not for the production of fish feed. Other items which include mixed edible products from different origins will not be taken into account.

➡ Data availability

Data needed for the purpose of our analysis (GVA and Number of persons employed) will be collected for the historical period of 2008-2009-2010, from the following sources:

Table 22 – Sources of data for “Fishing” and “Fish processing”

| NACE rev 2 | Activity | Indicator | source | | Reference |
|--------------------|-----------------|--|---|----------------------|---|
| A 03.11 A 03.12 | Fishing | Gross Value added | The 2012 Annual Economic Report on the EU Fishing Fleet (STECF-12-10) | Link | Example for Italy: Table 5.11.2, pag. 187 |
| | | Number of persons employed (Total employed) | | | Example for Italy: Table 5.11.1, pag. 183 |
| C 10.20 | Fish processing | Gross Value added (value added at factor costs) | EUROSTAT SBS | Link | |
| | | Number of persons employed | | | |

| Prodcom code | Activity | Indicator | Source | |
|-------------------------------------|---|--------------------------|------------------|----------------------|
| From code 10201100 to code 10203400 | Fish processing fit for human consumption | Value of sold production | Eurostat Prodcom | Link |
| Codes 10204100 10204200 | Fish processing unfit for human consumption | Value of sold production | Eurostat Prodcom | |

A value chain approach would imply the computation of two further NACE codes (46.38 Wholesale of other food, including fish, crustaceans and molluscs and 47.23 Retail sale of fish, crustaceans and molluscs in specialised stores). Despite Wholesale may include also other items different than fish, we assume that wholesale of fish products constitutes the total of the NACE codes.

Table 23 - Sources of data for wholesale and retail of fish for Human consumption

| NACE rev 2 | Activity | Indicator | source | |
|------------|---|---|--------------|----------------------|
| 46.38 | Wholesale of other food, including fish, crustaceans and molluscs | Gross Value added | EUROSTAT SBS | Link |
| | | Number of persons employed | | |
| 47.23 | Retail sale of fish, crustaceans and molluscs in specialised stores | Gross Value added (value added at factor costs) | EUROSTAT SBS | Link |
| | | Number of persons employed | | |

➔ Methodology for managing data

✓ Step 1

First task is to calculate the % weight of each use (fit and unfit for human consumption) on the total value of sold processed production.

Table 24 – Total sold value of fish processing fit and unfit for human consumption for 2008 - 2009 - 2010 (Example for Italy) - million euro

| PRCCODE | 2008 | 2009 | 2010 |
|--|----------------|----------------|----------------|
| 10201100 | 41.0 | 35.4 | 39.9 |
| 10201200 | 0.2 | 0.1 | 0.1 |
| 10201330 | 179.9 | 145.7 | 165.7 |
| 10201360 | 0.0 | 0.0 | 0.0 |
| 10201400 | 14.4 | 9.0 | 11.8 |
| 10201500 | 7.6 | 4.2 | 8.4 |
| 10201600 | 23.4 | 0.0 | 0.0 |
| 10202100 | 49.0 | 52.7 | 75.7 |
| 10202200 | 0.0 | 0.0 | 0.0 |
| 10202300 | 40.4 | 23.8 | 26.9 |
| 10202420 | 26.5 | 30.2 | 29.3 |
| 10202450 | 0.0 | 0.0 | 0.0 |
| 10202480 | 7.1 | 8.0 | 7.9 |
| 10202510 | 18.8 | 19.8 | 17.9 |
| 10202520 | 0.0 | 0.0 | 0.0 |
| 10202530 | 21.8 | 10.5 | 11.2 |
| 10202540 | 401.5 | 422.1 | 448.8 |
| 10202550 | 4.0 | 3.8 | 6.5 |
| 10202560 | 55.9 | 89.3 | 68.0 |
| 10202570 | 2.8 | 8.4 | 9.4 |
| 10202580 | 80.0 | 42.5 | 41.3 |
| 10202590 | 59.8 | 44.6 | 54.2 |
| 10202630 | 0.0 | 0.0 | 0.0 |
| 10202660 | 0.0 | 0.0 | 0.0 |
| 10203100 | 10.5 | 6.3 | 6.1 |
| 10203200 | 70.3 | 57.9 | 82.3 |
| 10203300 | 19.0 | 0.0 | 0.0 |
| 10203400 | 154.8 | 96.8 | 110.7 |
| Total for human consumption | 1 288.9 | 1 111.3 | 1 221.9 |
| 10204100 | 0.0 | 0.0 | 0.0 |
| 10204200 | 0.0 | 0.0 | 0.0 |
| Total not for human consumption | 0.0 | 0.0 | 0.0 |
| Total | 1 288.9 | 1 111.3 | 1 221.9 |
| % fit for human consumption | 100 | 100 | 100 |
| % unfit for human consumption | 0 | 0 | 0 |

✓ **Step 2**

In that way it will be possible to assign that percentages (food use and non-food use) to the GVA and employment SBS data for C 1020 activity. In the example of Italy there is no activity of fishing processing for animal feeding, so the 100% of value of sold production is for human consumption.

✓ **Step 3**

Preliminary figures needed for analysing the two sub-function “Fish for human consumption” and “fishing for animal feeding” will derive by summing up “fishing activities” and weighted “fish processing”, both for GVA and Number of persons employed, as showed in the tables below:

Table 25 - GVA for Fishing and for fish processing (for human consumption and animal feeding) for 2008 - 2009 - 2010
(Example for Italy) - million euro

| | | 2008 | 2009 | 2010 |
|-------------------------|--|-------|-------|-------|
| Sub-function 2.1 | Fishing | 579,6 | 763 | 652,9 |
| | Fish processing fit for human consumption | 270,1 | 295,8 | 298,2 |
| Sub-function 2.2 | Fish processing unfit for human consumption (animal feeding) | 0 | 0 | 0 |

Table 26 – Number of persons employed for Fish Fishing and for fish processing (for human consumption and animal feeding) for 2008 - 2009 - 2010 (Example for Italy) - units

| | | 2008 | 2009 | 2010 |
|-------------------------|--|--------|--------|-----------|
| Sub-function 2.1 | Fishing | 29.349 | 28.967 | 28.982,36 |
| | Fish processing fit for human consumption | 5.962 | 5.343 | 5.615 |
| Sub-function 2.2 | Fish processing unfit for human consumption (animal feeding) | 0 | 0 | 0 |

✓ **Step 4**

GVA and Number of persons employed for Wholesale (NACE rev.2 46.38) and Retail (NACE rev.2 47.23) have been excluded from the computation above, given that only fish products for human consumption are sold at these stages.

Table 27 - GVA for Wholesale and retail for 2008 - 2009 - 2010 (Example for Italy) - million euro

| | | 2008 | 2009 | 2010 |
|--------------|---|---------|---------|---------|
| 46.38 | Wholesale of other food, including fish, crustaceans and molluscs | 1.434,0 | 1.271,2 | 1.534,9 |
| 47.32 | Retail sale of fish, crustaceans and molluscs in specialised stores | 118,4 | 173,3 | 138,3 |

Table 28 – Number of persons employed for Wholesale and retail for 2008 - 2009 - 2010 (Example for Italy) - units

| | | 2008 | 2009 | 2010 |
|--------------|---|--------|--------|--------|
| 46.38 | Wholesale of other food, including fish, crustaceans and molluscs | 33.847 | 33.807 | 34.288 |
| 47.32 | Retail sale of fish, crustaceans and molluscs in specialised stores | 11.224 | 11.258 | 11.418 |

✓ Step 5

Figures for wholesale and retail will be added to sub-function 2.1 (fish for human consumption). The final figures will be as follows:

Table 29 - GVA for Fishing and for fish processing (for human consumption and animal feeding) for 2008 - 2009 - 2010 (Example for Italy) - million euro

| | | 2008 | 2009 | 2010 |
|-------------------------|---|----------|----------|----------|
| Sub-function 2.1 | Fish fit for human consumption | 2.402,10 | 2.503,30 | 2.624,30 |
| Sub-function 2.2 | Fish unfit for human consumption (animal feeding) | 0 | 0 | 0 |

Table 30 – Number of persons employed for Fish Fishing and for fish processing (for human consumption and animal feeding) for 2008 - 2009 - 2010 (Example for Italy) - units

| | | 2008 | 2009 | 2010 |
|-------------------------|---|--------|--------|--------|
| Sub-function 2.1 | Fish fit for human consumption | 80.382 | 79.375 | 80.303 |
| Sub-function 2.2 | Fish unfit for human consumption (animal feeding) | 0 | 0 | 0 |

➡ Key to allocate between sea basins

Since data on fish landings are available at sea basin level through several sources, it is proposed to use these as a proxy.

The need for allocating data between different sea basins concerns to 5 Member States: Denmark, France, Germany, Spain, and the UK.

As regards Denmark, France and the UK, it is proposed to use the data available through the European Market Observatory of Fisheries and Aquaculture products (EUMOFA, [link](#)). According to the EUMOFA, landings can be allocated as follows:

| | | Value (euro) - 2012 | % | Volume (tonnes) - 2012 | % |
|----------------|---------------------------------|------------------------|--------|------------------------|--------|
| Denmark | Baltic Sea | 34.571.726,69 | 11,09% | 33.373,81 | 13,38% |
| | North Sea | 277.214.734,86 | 88,91% | 216.055,13 | 86,62% |
| | TOT. | 311.786.461,55 | | 249.428,94 | |
| France | Bay of Biscay and Iberian Coast | 349.923.610,42 | 55,76% | 98.443,27 | 47,48% |
| | Celtic Seas | 174.532.753,18 | 27,81% | 68.189,90 | 32,89% |
| | Mediterranean | 32.184.971,14 | 5,13% | 8.632,43 | 4,16% |
| | North Sea | 70.870.462,13 | 11,29% | 32.078,08 | 15,47% |
| | TOT. | 627.511.796,87 | | 207.343,67 | |
| United Kingdom | Celtic Seas | 333.843.963,44 | 45,11% | 169.725,68 | 36,74% |
| | North Sea | 406.205.999,99 | 54,89% | 292.227,73 | 63,26% |
| | TOT. | 740.049.963,43 | | 461.953,41 | |

“Celtic Seas” and “Bay of Biscay and Iberian Coast” are names used for the EUMOFA’s purposes, but can be entirely attributed to the Atlantic Sea.

The year of reference is 2012, but it is reasonable to assume that the proportion of landings between sea basins is similar in the previous years. If necessary, a query can be executed via the Observatory’s website to collect data for another year.

Value is recommended, as it is more related to the economic dimension of fisheries.

As regards Spain and France, data are not available via the EUMOFA. Sector reports and statistical institute, however, report fish landings broken down by sea basins:

Germany: the report [Die Hochsee- und Küstenfischerei in der Bundesrepublik Deutschland](#) (2001), published by BLE, report fish landings by Länder. It should be easy to separate Baltic from North Sea Länder, and assign the respective shares. The only problem is with Schleswig-Holstein which borders on both the Baltic and the North Sea. It is suggested that the country expert investigate whether it is possible to have further specification at Länder level.

Spain: data on landings are available via the statistical institutes of the Autonomous Communities. It turns out that on a total of 392.008.056,86 kg landed in Spain in 2010, 85.732.162,06 (**21,87%**) were landed in Mediterranean ports, while 306.275.894,80 (**78,13%**) were landed in Atlantic ports. These data do not consider fish landed in the Balearic Islands, the Canary Islands, Ceuta and Melilla. It is estimated that these landings would not alter the above proportion significantly. Data on value are landings were not available for all the autonomous communities, however, once again, the proportion is likely to remain the same.

3.3 Marine aquatic products

➤ Identification of the sectors of the sub-function’s value chain

A specific NACE code is available for this sub-function: 03.21 Marine aquaculture, but no data are available in EUROSTAT SBS.

➔ Data availability

No data are available in EUROSTAT database.

The following source of data is proposed to be used.

| NACE rev 2 | Activity | Indicator | source | | Reference |
|------------|--------------------|----------------------------|--|----------------------|---|
| 03.21 | Marine aquaculture | Gross Value added | JRC Technical report, <i>An Approach Towards European Aquaculture Performance Indicators</i> | Link | Specific data can be requested to COGEA |
| | | Number of persons employed | | | |

➔ Methodology for managing data

In the JRC report, GVA and persons employed are available for: freshwater, marine and shellfish farming. For the purpose of our analysis, marine and shellfish farming will be summed up.

➔ Key to allocate between sea basins

A study published by the European Parliament in 2007 (with 2005 data) “Regional dependency on fisheries” report aquaculture production broken down by Member State and sea basin. The situation for our country of interest is as follows:

| | | Value added (mln Euro) - 2005 | % |
|----------------|---------------|-------------------------------|--------|
| Spain | Mediterranean | 93,8 | 43,09% |
| | Atlantic | 123,9 | 56,91% |
| | TOT. | 217,7 | |
| Germany | Baltic | 0,8 | 53,33% |
| | North Sea | 0,7 | 46,67% |
| | TOT. | 1,5 | |
| France | Mediterranean | 31,3 | 9,73% |
| | Atlantic | 290,3 | 90,27% |
| | TOT. | 321,6 | |
| United Kingdom | Atlantic | 187,4 | 82,05% |
| | North Sea | 41,0 | 17,95% |
| | TOT. | 228,4 | |

As regards Denmark, information by region is available on the “Fiskeristatistisk Årbog” ([link](#)) a publication issued by a Ministry of Agriculture and Fisheries. Aquaculture production is broken down by region, and it is proposed that the country expert attributes each region to a sea basin.

3.4 Blue biotechnology

➔ Identification of the sectors of the sub-function's value chain

Blue biotechnology is an “umbrella term” that covers all possible applications of technology and science to living organisms of the sea. It is therefore very difficult to define the limits of the sector, especially taking into account that it affects several different fields, e.g.:

- Foods
- Nutraceuticals
- Medicine
- Healthcare
- Cosmetics
- Research tools
- Processing technology
- New energy sources
- Agriculture
- Industry
- Food safety
- Environment enhancement

It is not possible to establish direct links to NACE codes.

➔ Data availability

No data are available through EUROSTAT or other international sources. A revision of industry codings should be undertaken in order to take into account the weight of blue biotechnology of each of the above sectors. At present it is impossible to find a single source providing data by MS on the GVA and employment in the blue biotechnology sector, nor does it seem realistic to calculate reliable proxies.

The only possible solution is to investigate whether specific studies and/or reports exist at the national level, with data on GVA and employment, or with some useful proxies.

3.5 Agriculture on saline soils

➔ Identification of the sectors of the sub-function's value chain

Statistics on GVA and employment derive from EUROSTAT and do not distinguish between agriculture on saline soils and agriculture on not saline soils.

According to EAA 97 Rev.1.1 classification, the GVA of agriculture and farming is calculated at basic prices for the 2005 – 2010 period.

The total number of persons employed as Regular Labour force is available on EUROSTAT statistics on Structure of holdings for three years: 2005, 2007 and 2010.

Saline soils are defined in the **Saline and Sodic Soils Map (JRC, see this [link](#))** that shows the distribution of saline, sodic and potentially salt affected areas within the European Union.

To estimate GVA and employment of agriculture on saline soils, first of all the **% of agriculture surfaces on saline soil on the total agricultural area at NUTS 2 level** has been calculated by using GIS environment. In this way, landlocked regions have been excluded.

For this purpose, two geographical datasets have been used.

The first one is the Corine Land Cover dataset, referred to 2006 or 2000 (only for Greece), both updated in 2012 and available on the EEA website:

<http://www.eea.europa.eu/data-and-maps/data/clc-2006-vector-data-version-2>

<http://www.eea.europa.eu/data-and-maps/data/corine-land-cover-2000-clc2000-seamless-vector-database-4>

For our purposes we need to merge together areas of the following classes of agricultural land cover:

| | |
|--------------------------------------|--|
| 2.1 Arable land | 2.1.1 Non-irrigated arable land |
| | 2.1.2 Permanently irrigated land |
| | 2.1.3 Rice fields |
| 2.2 Permanent crops | 2.2.1 Vineyards |
| | 2.2.2 Fruit trees and berry plantations |
| | 2.2.3 Olive groves |
| 2.3 Pastures | 2.3.1 Pastures |
| 2.4 Heterogeneous agricultural areas | 2.4.1 Annual crops associated with permanent crops |
| | 2.4.2 Complex cultivation patterns |
| | 2.4.3 Land principally occupied by agriculture, with significant areas of natural vegetation |
| | 2.4.4 Agro-forestry areas |

The second geographical dataset is the **“Saline and Sodic Soils Map” published by the JRC on November 2009 and available, upon request, on the European Soil Portal:**

<http://eusoils.jrc.ec.europa.eu/library/themes/salinization/data.html>

The accuracy of input data only allows the designation of salt affected areas with a limited level of reliability (e.g. < 50 or > 50% of the area)

For our purposes areas of the following classes of soil salinisation have been merged:

- 1 - Saline > 50% of the area
- 2 - Sodic > 50% of the area
- 3 - Saline < 50% of the area
- 4 - Sodic < 50% of the area
- 5 - Potentially salt affected soils.

In GIS we overlapped and intersected the layer of saline areas with the layer of agricultural areas. In this way, the agricultural saline areas layer by region has been achieved.

The percentage of agricultural saline area on the total agricultural area will be applied to estimate its fix contribution on the total agriculture GVA and the employment for years 2005, 2007,2010 and for coastal regions.

Regional % of agriculture on saline soils for all NUTS2 level regions with salinization problems have been provided.

Table 31 – Coefficient for saline soil agriculture calculation (GIS elaborations on EEA and JRC geographical datasets)

| Regions | Total agricultural area (1000 ha) | Saline soils area (1000 ha) | Agricultural area on saline soils (1000 ha) | Regional % of saline agricultural area |
|---------|-----------------------------------|-----------------------------|---|--|
| BG33 | 986.9 | 9.3 | 4.8 | 0.48 |
| BG34 | 1029.8 | 182.8 | 115.9 | 11.25 |
| CY00 | 438.8 | 15.1 | 9.5 | 2.16 |
| DE50 | 14.7 | 0.01 | 0.003 | 0.02 |
| DE60 | 23.1 | 0.3 | 0.021 | 0.09 |
| DE93 | 1027.4 | 2.5 | 0.1 | 0.01 |
| DE94 | 1187.3 | 4.7 | 0.1 | 0.01 |
| DEF0 | 1225.9 | 8.6 | 0.6 | 0.05 |
| DK03 | 969.3 | 0.01 | 0.001 | 0 |
| EL12 | 985.6 | 67.8 | 57.4 | 5.8 |
| EL14 | 618.1 | 188.5 | 149.7 | 24.2 |
| EL21 | 229.7 | 74.5 | 45.2 | 19.7 |
| EL22 | 113.2 | 0.4 | 0 | 0.0 |
| EL23 | 479.9 | 187 | 121.5 | 25.3 |
| EL24 | 511.0 | 90.1 | 70.7 | 13.8 |
| EL25 | 578.5 | 24.5 | 22.1 | 3.8 |
| EL30 | 114.3 | 17.1 | 9.6 | 8.4 |
| EL41 | 148.0 | 6.3 | 3.3 | 2.2 |
| EL43 | 332.2 | 38.2 | 31.4 | 9.4 |
| ES21 | 223.4 | 2.8 | 1.7 | 0.75 |
| ES51 | 1263.3 | 667.8 | 444.7 | 35.2 |
| ES52 | 1040.4 | 923.9 | 471.4 | 45.31 |
| ES53 | 285 | 216.5 | 153.1 | 53.71 |
| ES61 | 4859.9 | 2149.7 | 1325.2 | 27.27 |
| ES62 | 646.7 | 744.3 | 458.5 | 70.9 |
| FR23 | 906.7 | 32.9 | 16 | 1.76 |
| FR25 | 1539.9 | 20.7 | 18.8 | 1.22 |
| FR51 | 2712.5 | 153.9 | 123.2 | 4.54 |
| FR52 | 2195.9 | 34.7 | 31.2 | 1.42 |
| FR53 | 2077.7 | 126.8 | 96.5 | 4.65 |
| FR61 | 1953.9 | 54.5 | 23.9 | 1.22 |
| FR81 | 1027.7 | 141.1 | 83.5 | 8.13 |
| FR82 | 748.3 | 137 | 37 | 4.94 |
| FR83 | 101.1 | 66 | 29.7 | 29.41 |
| ITF4 | 1605.2 | 70.6 | 41.8 | 2.6 |
| ITF6 | 733.7 | 24 | 18.1 | 2.46 |
| ITG1 | 1757.7 | 46 | 37 | 2.11 |
| ITG2 | 1045.9 | 117.1 | 60 | 5.74 |
| ITH3 | 1048.1 | 189.6 | 157.3 | 15.01 |
| ITH4 | 307.4 | 1.1 | 0.4 | 0.14 |
| ITH5 | 1514 | 170.3 | 149.4 | 9.87 |
| PT11 | 930.7 | 2.1 | 0.6 | 0.06 |
| PT15 | 200 | 60.3 | 24.6 | 12.29 |
| PT16 | 1014.7 | 131.3 | 57.6 | 5.68 |
| PT17 | 129 | 31.7 | 19.2 | 14.89 |
| PT18 | 1922.6 | 180.3 | 95.3 | 4.96 |
| RO22 | 2283.3 | 1634.6 | 1089.3 | 47.71 |
| SI02 | 204.4 | 4 | 2.3 | 1.15 |

In the table above:

- Only NUTS 2 presenting saline soils have been included;
- Only littoral NUTS 2 have been reported.

➔ Data availability

Data regarding GVA and persons employed are available in EUROSTAT database (Economic Account of Agriculture and Structure of agricultural holdings). Basic data needed which should be downloaded for the purpose of our analysis are:

- Gross Value added at basic prices
- Number of persons employed

| | Eurostat code | Descr | EUROSTAT position |
|-------------|---------------|--|----------------------|
| Agriculture | 20000 | Gross Value Added At Basic Prices at regional NUTS 2 level | Link |
| | LFR_PERS | Regular Labour force (persons) at regional NUTS 2 level | Link |

➔ Methodology for managing data

Coefficients reported in Table 31 should be then applied to data collected on EUROSTAT database for GVA and persons employed in agriculture and farming to obtain GVA and employment in saline agricultural areas.

In tables below data for Italian regions **before** the coefficient calculation:

Table 32 - GVA of agriculture and farming for 2005-2010 (Example for Italy) - million euro

| | | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|------|-----------------------|---------|---------|---------|---------|---------|---------|
| ITH3 | Veneto | 2 284.1 | 2 100.6 | 2 312.8 | 2 223.2 | 2 033.4 | 2 068.0 |
| ITH4 | Friuli-Venezia Giulia | 384.2 | 383.8 | 451.3 | 376.5 | 295.0 | 309.6 |
| ITH5 | Emilia-Romagna | 2 638.9 | 2 742.7 | 2 774.8 | 2 828.8 | 2 480.9 | 2 537.1 |
| ITF4 | Puglia | 2 308.7 | 2 082.0 | 1 949.7 | 2 099.4 | 1 721.5 | 1 795.8 |
| ITF6 | Calabria | 1 460.6 | 1 334.5 | 1 367.6 | 1 103.3 | 1 062.7 | 997.3 |
| ITG1 | Sicilia | 2 718.4 | 2 622.8 | 2 552.7 | 2 668.9 | 2 514.7 | 2 505.8 |
| ITG2 | Sardegna | 876.8 | 875.1 | 865.2 | 883.8 | 845.0 | 779.8 |

Table 33 – Number of persons employed in agriculture and farming for 2005 - 2007 - 2010 (Example for Italy) - units

| | | 2005 | 2007 | 2010 |
|------|-----------------------|---------|---------|---------|
| ITH3 | Veneto | 275 550 | 272 370 | 255 890 |
| ITH4 | Friuli-Venezia Giulia | 49 000 | 54 520 | 48 140 |
| ITH5 | Emilia-Romagna | 167 950 | 174 540 | 170 660 |
| ITF4 | Puglia | 442 530 | 441 930 | 559 070 |
| ITF6 | Calabria | 229 480 | 222 880 | 280 110 |
| ITG1 | Sicilia | 421 890 | 387 290 | 429 770 |
| ITG2 | Sardegna | 119 650 | 121 650 | 120 490 |

GVA and Number of persons employed **by NUTS 2 for agriculture on saline soils** are reported below:

Table 34 - GVA of agriculture and farming on saline soils for 2005-2010 at NUTS 2 level (Example for Italy) - million euro

| | | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|------|-----------------------|--------|--------|--------|--------|--------|--------|
| ITH3 | Veneto | 342,84 | 315,30 | 347,15 | 333,70 | 305,21 | 310,41 |
| ITH4 | Friuli-Venezia Giulia | 0,54 | 0,54 | 0,63 | 0,53 | 0,41 | 0,43 |
| ITH5 | Emilia-Romagna | 260,46 | 270,70 | 273,87 | 279,20 | 244,86 | 250,41 |
| ITF4 | Puglia | 60,03 | 54,13 | 50,69 | 54,58 | 44,76 | 46,69 |
| ITF6 | Calabria | 35,93 | 32,83 | 33,64 | 27,14 | 26,14 | 24,53 |
| ITG1 | Sicilia | 57,36 | 55,34 | 53,86 | 56,31 | 53,06 | 52,87 |
| ITG2 | Sardegna | 50,33 | 50,23 | 49,66 | 50,73 | 48,50 | 44,76 |

Table 35 – Number of persons employed of agriculture and farming on saline soils for 2005-2010 at NUTS 2 level (Example for Italy) - unit

| | | 2005 | 2007 | 2010 |
|------|-----------------------|----------|----------|----------|
| ITH3 | Veneto | 41360,06 | 40882,74 | 38409,09 |
| ITH4 | Friuli-Venezia Giulia | 68,60 | 76,33 | 67,40 |
| ITH5 | Emilia-Romagna | 16576,67 | 17227,10 | 16844,14 |
| ITF4 | Puglia | 11505,78 | 11490,18 | 14535,82 |
| ITF6 | Calabria | 5645,21 | 5482,85 | 6890,71 |
| ITG1 | Sicilia | 8901,88 | 8171,82 | 9068,15 |
| ITG2 | Sardegna | 6867,91 | 6982,71 | 6916,13 |

Finally, the national total:

Table 36 - GVA of agriculture and farming on saline soils for 2005-2010 (Example for Italy) - million euro

| 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---------------|---------------|--------------|---------------|---------------|--------------|
| 807,49 | 779,07 | 809,5 | 802,19 | 722,94 | 730,1 |

Table 37 – Number of persons employed of agriculture and farming on saline soils for 2005-2010 (Example for Italy) - unit

| 2005 | 2007 | 2010 |
|-----------------|-----------------|-----------------|
| 90926,11 | 90313,73 | 92731,44 |

Key to allocate between sea basins

The methodology proposed above provides data at NUTS 2 level.

4. Energy and raw materials

4.1 Offshore oil and gas

➤ Definition of the Maritime Economic Activity

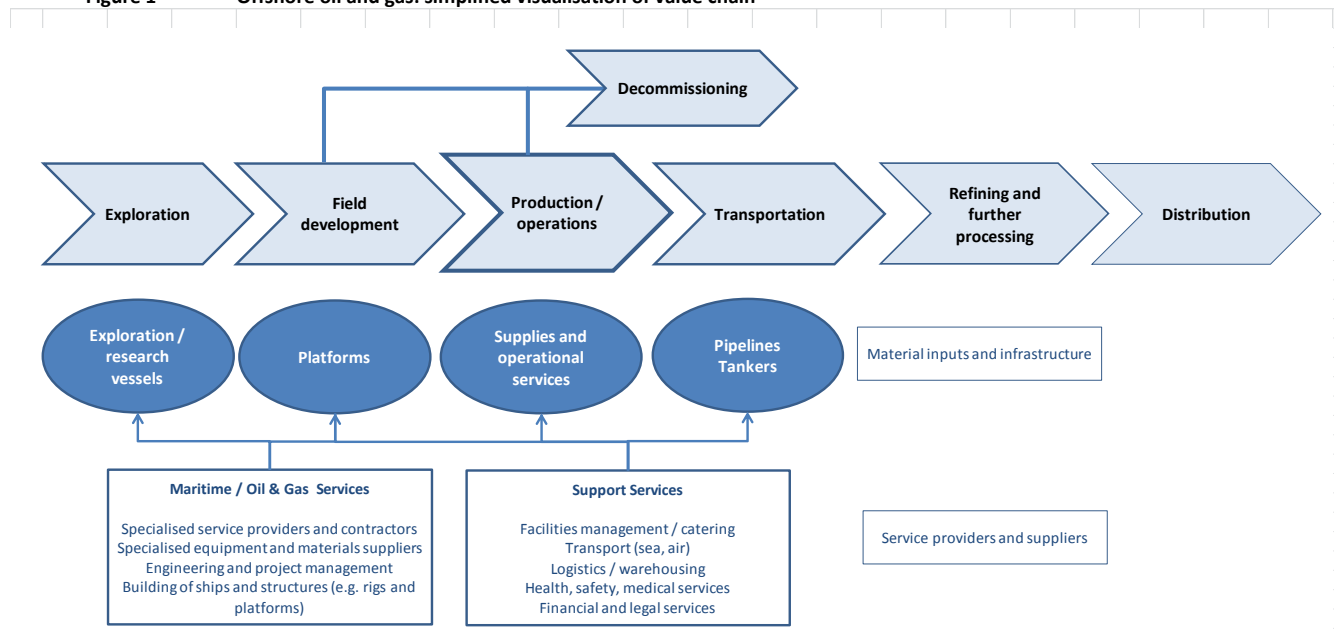
This MEA covers offshore extraction and processing of fossil fuels (hydrocarbons). The MEA consists of two main segments:

- Crude oil production.
- Natural gas production.

➤ Description of the value chain

The value chain of the offshore oil and natural gas MEA is illustrated in **Error! Reference source not found.**, which is based on Ecorys (2012)² and supplementary information relating to the sector³.

Figure 1 Offshore oil and gas: simplified visualisation of value chain



➤ Principal maritime (offshore) value-added generating activities

The (upstream) offshore oil and gas value chain consists of the following main activities:

²Ecorys (2012), 'Blue Growth: Scenarios and Drivers for Sustainable Growth from Oceans, Seas and Coasts', together with the accompanying 'Maritime Sub-Function Profile Report: Offshore oil and natural gas (3.1)'.
³Oil & Gas UK (2012), 'Economic Report 2012'; Ernst and Young (2012), 'Review of the UK oilfield services industry 2012'.

- **Exploration:** covering activities such as acquisition/analysis of seismic data, and production drilling;
- **Field development:** covering activities such as engineering, and fabrication and installation of rigs, platforms, etc.;
- **Production and operation (exploitation):** covering activities to bring oil and gas to the surface
- **Processing:** primarily concerned with offshore processing of raw natural gas to attain 'pipeline quality' (i.e. 'cleaning' of raw natural gas to remove water, impurities, hydrocarbons, etc.)
- **Transportation:** covering offshore to onshore transportation via pipeline or ship (e.g. shuttle tankers)

In addition, the offshore component of value chain can be taken to include:

- **Decommissioning:** covering activities to decommission offshore oil and gas infrastructure.

➞ Downstream (non-maritime) value-added generating activities

The above mentioned (upstream) activities, integrate into the overall oil and gas value chain, that encompasses (downstream) activities such as:

- Transportation and storage (onshore);
- Refining and further processing using oil and gas as a feedstock (e.g. petrol refining);
- Energy supply (e.g. gas supply, electricity generation);
- Transformation of oil and gas products used as intermediate inputs in a wide range of industrial sectors;
- Distribution and marketing.

➞ Supporting suppliers and service providers

The (upstream) offshore oil and gas production activities also rely on a wide range of suppliers of goods and services, with varying degrees of specialisation towards the oil and gas sector and, more specifically, to offshore oil and gas extraction and processing. In general terms, these can be sub-divided into two main categories:

1. **Specialist suppliers of 'Maritime' / 'Oil & Gas' equipment, materials and services.** Primarily this covers the supply of specialised products and services to the offshore oil and gas sector. Typically this would cover products and services provided by the main contractors and specialist service providers (e.g. consultancies) of the operators of offshore oil and gas facilities.
2. **Suppliers of other supporting services.** Primarily this covers other types of 'external' services supplied to the operators of offshore oil and gas facilities. This includes 'outsourced' services (e.g. facilities management, catering, transport, logistics, etc.) and other specialist and professional services (e.g. financial, legal, etc.)

➞ Linking the value chain components to NACE sectors

Table 55 provides an overview of the NACE codes that relevant for principal maritime (offshore) value-added generating activities of the oil and gas sector; a more detailed description is given in **Error! Reference source not found.**

As indicated above, the offshore oil and gas sector also encompasses or makes use of a wide range of specialised and non-specialised suppliers of equipment, materials and services. A priori, it is difficult to identify the relative importance of these 'supporting' activities within the overall value chain of the offshore oil and gas sector. This may require a more in-depth assessment of the value (and supply) chain of the offshore oil and gas sector in order to establish the most important economic activities that are linked to the sector. An alternative approach may be to make use of (national) Input-Output Tables (or Supply and Use Tables); such an approach is investigated in the Annex 2. Based on such analysis – undertaken for the UK –NACE codes that may be of particular relevance in the context of the 'supporting' activities in the overall value chain of the offshore oil and gas sector are indicated in **Error! Reference source not found.**

Table 38 Overview of main NACE codes for principal value-added generating activities (VGA) of the offshore oil and gas sector

| NACE Rev. 2 code – Economic activity | Type | Corresponding MEA value chain components (VGA) | Comments |
|---|------|--|--|
| 06.10 Extraction of crude petroleum | S | Production / operations | Requires a separation between offshore and onshore activities |
| 06.20 Extraction of natural gas | S | Production / operations Processing (offshore) | Requires a separation between offshore and onshore activities |
| 09.10 Support activities for petroleum and natural gas extraction | S | Exploration Decommissioning | Requires a separation between offshore and onshore activities |
| 30.11 Building of ships and floating structures | P | Field development | Disregarded but addressed as a separate sector outside of MEA |
| 33.15 Repair and maintenance of ships and boats | P | Field development | Disregarded but addressed as a separate sector outside of MEA |
| 49.50 Transport via pipelines | T | Transportation | Disregard here but address as part of the indirect effects estimate using I/O tables (only for selected countries – Ecorys) |
| 50.20 Sea and coastal water transport | P | Transportation | Disregarded here but assigned fully to MEAs 1.1 and 1.2 |
| 71.12 Engineering activities and related technical consultancy | T | Exploration | Disregard here but address as part of the indirect effects estimate using I/O tables (only for selected countries – Ecorys) |
| 38.31 Dismantling of wrecks | T | Decommissioning | Disregard since a lot in this sector is non-maritime. Requires identification of part of 'offshore oil and gas' in total. May be relevant for some other MEAs |

Many other sectors are also of (some) relevance to the offshore oil and gas industry. These are listed below. For the purposes of estimating the direct economic size of this MEA, they are disregarded, mainly because they are considered indirect and because it is hardly possible to define which share of each would relate to this MEA. Instead, as an add-on analysis (only for selected countries led by Ecorys), Input-Output analyses will be tested to estimate indirect effects related to offshore oil and gas.

See annex 2 for an elaboration on I/O analysis.

Table 39 Overview of main NACE codes for 'supporting' value-added generating activities (VGA) of the offshore oil and gas sector (all disregarded in the estimation)

| NACE Rev. 2 code – Economic activity | Type | Comments |
|---|------|--|
| Parts of 20: Manufacture of chemicals and chemical products | T | |
| Parts of 25: Manufacture of fabricated metal products, except machinery and equipment | T | |
| Parts of 28: Manufacture of machinery and equipment n.e.c. | T | |
| Parts of 33: Repair and installation of machinery and equipment | | Specifically: 33.15 Repair and maintenance of ships and boats |
| Parts of 41: Construction of buildings | T | |
| Parts of 42: Civil engineering | T | |
| Parts of 43: Specialised construction activities | T | |
| Parts of 49: Land transport and transport via pipelines | T | Covering transport services (e.g. 49.20 Freight rail transport) not already covered elsewhere (cf. 49.50, 50.20). Propose to disregard. |
| Parts of 64: Financial service activities, except insurance and pension funding | T | Relevant to a multitude of sectors, including largely non-maritime. Propose to disregard. |
| Parts of 69: Legal and accounting activities | T | Covers both 69.10 Legal activities and 69.20 Accounting, bookkeeping and auditing activities; tax consultancy. Relevant to a multitude of sectors, including largely non-maritime. Propose to disregard. |
| Parts of 71: Architectural and engineering activities; technical testing and analysis | T | Relevant to a multitude of sectors, including largely non-maritime. Propose to disregard. |
| Parts of 72: Scientific research and development | | Relevant to a multitude of sectors, including largely non-maritime. Propose to disregard. |
| Parts of 78: Employment activities | T | Relevant to a multitude of sectors, including largely non-maritime. Propose to disregard. |

Table 40 Details of correspondence between principal maritime (offshore) value-added generating activities (VGA) and NACE codes

| Value Chain Component (VGA) | Corresponding NACE Codes | NACE code: scope and definitions | Type | M / non-M split | Comment | MEA split | Comment |
|-----------------------------|---|--|------|-----------------|--|-----------|--|
| Exploration | 09.10 Support activities for petroleum and natural gas extraction | 09.10 includes: <ul style="list-style-type: none"> exploration services in connection with petroleum or gas extraction; e.g. traditional prospecting methods, such as making geological observations at prospective sites. directional drilling and redrilling; "spudding in"; derrick erection in situ, repairing and dismantling; cementing oil and gas well casings; pumping of wells; plugging and abandoning wells etc. test drilling in connection with petroleum or gas extraction | S | Yes | Requires an indicator of the relative share of offshore to onshore oil and gas extraction [Key M-NM3: See Annex 1] | No | |
| | 71.12 Engineering activities and related technical consultancy | 71.12 includes: <ul style="list-style-type: none"> geophysical, geologic and seismic surveying | T | Yes | Difficult to evaluate possible use of engineering and technical consultancy by maritime (versus non-maritime) activities – disregarded (part of I/O analysis) | Yes | Difficult to evaluate possible use of engineering and technical consultancy across a wide range of MEAs – disregarded (part of I/O analysis) |
| Field development | 30.11 Building of ships and floating structures | 30.11 includes building of ships (except vessels for sports or recreation) and the construction of floating structures: <ul style="list-style-type: none"> construction of drilling platforms, floating or submersible | P | No | | Yes | Disregarded but assessed as a separate sector outside MEAs |
| | 33.15 Repair and maintenance of ships and boats | 33.15 includes: <ul style="list-style-type: none"> repair and routine maintenance of ships | P | No | | Yes | Disregarded but assessed as a separate sector outside MEAs |
| Production / operations | 06.10 Extraction of crude petroleum | 06.10 includes: <ul style="list-style-type: none"> extraction of crude petroleum oils processes to obtain crude oils: decantation, desalting, dehydration, stabilisation etc | S | Yes | Requires an indicator of the relative share of offshore to onshore oil extraction [Key M-NM1: See Annex 1] | No | |
| | 06.20 Extraction of natural gas | 06.20 includes: <ul style="list-style-type: none"> production of crude gaseous hydrocarbon (natural gas) | S | Yes | Requires an indicator of the relative share of offshore to onshore natural gas extraction [Key M-NM2: See Annex 1] | No | |
| Processing (offshore) | 06.20 Extraction of natural gas | 06.20 includes: <ul style="list-style-type: none"> extraction of condensates draining and separation of liquid hydrocarbon fractions gas desulphurisation | S | Yes | Requires an indicator of the relative share of offshore to onshore natural gas extraction [Key M-NM2: See Annex 1] | No | |
| Transportation | 49.50 Transport via pipelines | 49.50 includes: <ul style="list-style-type: none"> transport of gases, liquids, water, slurry and other commodities via pipelines <p>NB: not clear if this activity code covers offshore transport via pipeline</p> | T | Yes | To be determined: <ul style="list-style-type: none"> How important is offshore to onshore transportation via pipeline? Is offshore to onshore transportation via pipeline captured under NACE 49.50 (is it subsumed under 06.10 and 06.20)? – disregarded (part of I/O analysis) | No | |
| | 50.20 Sea and coastal water transport | 50.20 includes: <ul style="list-style-type: none"> transport of freight over seas and coastal waters transport by towing or pushing of barges, oil rigs etc. | P | No | | Yes | Disregarded here. Assigned to MEAs 1.1 deepsea and 1.2 shortsea |
| Decommissioning | 09.10 Support activities for petroleum and natural gas extraction | 09.10 includes: <ul style="list-style-type: none"> directional drilling and redrilling; "spudding in"; derrick erection in situ, repairing and dismantling; cementing oil and gas well casings; pumping of wells; plugging and abandoning wells etc. | S | Yes | Requires an indicator of the relative share of offshore to onshore oil and gas extraction [Key M-NM3: See Annex 1] | No | |
| | 38.31 Dismantling of wrecks | 38.31 includes: <ul style="list-style-type: none"> This class includes dismantling of wrecks of any type (automobiles, ships, computers, televisions and other equipment) for materials recovery | T | Yes | Difficult to evaluate possible share of maritime (versus non-maritime) related recovery activities. Therefore disregarded. | Yes | Difficult to evaluate possible share of oil and gas related recovery activities (vis-à-vis other MEAs). Disregarded |

➔ Key to allocate NACE data to maritime vs non-maritime

Ecorys (2012) notes that more than 80% of European crude oil and natural gas production is offshore; for crude oil an estimated (turnover) share of 80-90% is indicated and for natural gas the corresponding figure is 45-65%. It appears that these shares have been applied to overall value added and employment in the EU oil and gas sector so as to provide estimates for the offshore (maritime) segment.

Available Eurostat data (e.g. SBS data for GVA and employment; Energy indicators for production of crude oil and natural gas) do not distinguish between onshore and offshore components of the oil and gas sector.

Two options for estimating the offshore components of employment and GVA in the oil and gas sectors (cf. NACE 06.10, 06.20, 09.10) seem possible:

1. **Top-down:** apply indicators based on the share of offshore production (e.g. production volumes) in total production by country to Eurostat (or national) estimates of employment and GVA in the oil and gas sectors. Such an approach is outlined in Annex 1.
2. **Bottom-up:** investigate possible industry/national sources of information on employment and GVA in the oil and gas sectors.⁴

Given that EU offshore oil and gas activities are largely concentrated in a few MS, a country by country approach focussed on the MS with the most important oil and gas sectors should be feasible. Moreover, it is probably advisable to use such an approach – at least for the main oil and gas producing countries – to support analysis based on ‘top-down’ approach.

| NACE Rev. 2 code – Economic activity | Key for maritime/ non-maritime (indicative) | | Comments |
|---|---|---|--|
| 06.10 Extraction of crude petroleum | N-NM1 | Share of offshore in total production of crude petroleum by country | See main text <i>Note: Initial identification of data source(s) providing indicators of offshore to onshore activity (e.g. production) is described in Annex 1.</i> |
| 06.20 Extraction of natural gas | N-NM2 | Share of offshore in total production of natural gas by country | See main text <i>Note: Idem.</i> |
| 09.10 Support activities for petroleum and natural gas extraction | N-NM3 | Share (weighted) of offshore production in total production of crude petroleum and natural gas by country | See main text <i>Note: Idem.</i> |

1 Key to allocate between sea basins

For the largest oil & gas producing countries, the locations of work are generally known (example UK is mainly North Sea). The allocation could thus be based on expert opinions. The UK publishes for instance a map on offshore concessions, see

⁴For example: Oil & Gas UK (2013) ‘2012 UKCS Workforce Demographics Report’, available at: <http://www.oilandgasuk.co.uk/cmsfiles/modules/publications/pdfs/EMO11.pdf>

<https://www.gov.uk/oil-and-gas-offshore-maps-and-gis-shapefiles>. Country experts should check if similar information can be found in their countries (for those bordering multiple sea basins only).

➔ Annex 1: Estimation of offshore component of oil and gas extraction

Data availability: offshore oil and gas production

Available Eurostat data (e.g. SBS data for GVA and employment; Energy indicators for production of crude oil and natural gas) do not distinguish between onshore and offshore components of the oil and gas sector. However, some estimates on the size of offshore production are provided by European Commission JRC (EU Offshore Authorities Group)⁵, which makes reference to individual country information indicating the relative size of offshore to onshore oil and gas production, namely:

- **UK:** DECC (Department of Energy & Climate Change) at: <https://www.gov.uk/oil-and-gas-uk-field-data>
- **Netherlands:** NL – Oil and Gas Portal at: <http://www.nlog.nl/en/production/production.html>
- **Italy:** UNMIG (Ministry for Economic Development) at: <http://unmig.sviluppoeconomico.gov.it/unmig/produzione/produzione.asp>
- **Denmark:** Danish Energy Agency “Oil and Gas production” report at: [http://www.ens.dk/Documents/Netboghandel%20-%20publikationer/2012/Oil_and_gas_production_in_Denmark_2011%20\(2\).pdf](http://www.ens.dk/Documents/Netboghandel%20-%20publikationer/2012/Oil_and_gas_production_in_Denmark_2011%20(2).pdf)

For other countries with offshore activities, the EU Offshore Authorities Group indicates that it uses the assumption that approximately 50% of the primary production of crude oil and 50% of the primary production of natural gas occurs offshore⁶. Following this approach, **Error! Reference source not found.** provides estimates of the offshore production share (EOPS) by country; supplementary data tables for the UK, Netherlands and Italy are provided at the end of this Annex (see **Error! Reference source not found.** to **Error! Reference source not found.**)

⁵ See: <http://euoag.jrc.ec.europa.eu/node/63>

⁶ This assertion does not seem to be strictly true, as an attempt to recalculate the Offshore Authorities Group estimates using Eurostat data results in estimates of the offshore that do not correspond to 50%, notably for Germany and France.

Table 41 Estimated share of offshore production in total oil and gas production by country (2011)

| | Total primary production of oil and gas ¹ | | | Estimated offshore production share (EOPS) | | | Estimated offshore production | | |
|-----------------------------|--|-------------|--------|--|-------------|-------|-------------------------------|-------------|--------|
| | Petroleum products | Natural Gas | Total | Petroleum products | Natural Gas | Total | Petroleum products | Natural Gas | Total |
| | TOE | TOE | TOE | N-NM1 | N-NM2 | N-NM3 | TOE | TOE | TOE |
| United Kingdom ² | 52,834 | 40,759 | 93,593 | 98% | 100% | 99% | 51,777 | 40,759 | 92,536 |
| Netherlands ³ | 1,840 | 57,742 | 59,582 | 84% | 30% | 32% | 1,546 | 17,323 | 18,868 |
| Denmark ⁵ | 11,250 | 6,321 | 17,571 | 100% | 100% | 100% | 11,250 | 6,321 | 17,571 |
| Germany ⁵ | 3,973 | 10,893 | 14,866 | 34% | 50% | 46% | 1,351 | 5,447 | 6,797 |
| Romania ⁵ | 4,368 | 8,667 | 13,035 | 48% | 50% | 49% | 2,097 | 4,334 | 6,430 |
| Italy ⁴ | 5,886 | 6,920 | 12,806 | 11% | 73% | 45% | 647 | 5,052 | 5,699 |
| Poland ⁵ | 685 | 3,850 | 4,535 | 50% | 50% | 50% | 343 | 1,925 | 2,268 |
| France ⁵ | 1,154 | 506 | 1,660 | 40% | 50% | 43% | 462 | 253 | 715 |
| Bulgaria ⁵ | 22 | 351 | 373 | 50% | 50% | 50% | 11 | 176 | 187 |
| Ireland ⁵ | 0 | 284 | 284 | : | 50% | 50% | : | 142 | 142 |
| Spain ⁵ | 101 | 45 | 146 | 50% | 50% | 50% | 51 | 23 | 73 |
| Lithuania ⁵ | 116 | 0 | 116 | 50% | : | 50% | 58 | : | 58 |
| Greece ⁵ | 99 | 6 | 105 | 50% | 50% | 50% | 50 | 3 | 53 |

Notes and sources:
1 Primary production: Eurostat Energy Statistics
2 UK EOPS: based on UK Department of Energy and Climate Change
3 NL EOPS: based on NL Ministry of Economics (Oil & Gas Portal)
4 Italy EOPS: based on Ministry of Economic Development – Direction General for Mineral Resources and Energy
5 Other countries EOPS: based on European Commission JRC (EU Offshore Authorities Group)

Estimation of offshore shares of oil and gas extraction

Using the aforementioned sources, the following approach is proposed to provide a baseline estimate of the share of offshore production in total oil and gas extraction:

- For UK, Netherlands and Italy, national sources are available to estimate production shares for oil (petroleum products) and natural gas separately (see **Error! Reference source not found.** to **Error! Reference source not found.**). To estimate an aggregate share for oil and gas production, a weighted average of the offshore shares for oil extraction and gas extraction requires a suitable weighting factor. **Error! Reference source not found.** uses the annual total primary production in TOE (tonnes of oil equivalent) from as the basis for the weighting factor.
- For Denmark, 100% of extraction activity is assumed to be offshore (all years)
- For Germany and France, 45% of extraction is assumed to be offshore (all years), based on EU Offshore Authorities Group estimates (see **Error! Reference source not found.**)
- For all other countries, following EU Offshore Authorities Group, 50% of extraction is assumed to be offshore (all years).

The validity of the above assumptions should be verified at a national level.

Table 42 Calculation of aggregate (oil plus natural gas) production shares: UK, NL and IT

| | Breakdown of primary production (1000 TOE) ¹ | | | | | | Estimated offshore production share | | |
|--|---|-----|---------|-----|---------|-----|-------------------------------------|------|------|
| | 2008 | | 2009 | | 2010 | | 2008 | 2009 | 2010 |
| UK² | | | | | | | | | |
| Petroleum products | 73,725 | 54% | 70,186 | 57% | 63,977 | 55% | 98% | 98% | 98% |
| Natural gas | 62,699 | 46% | 53,748 | 43% | 51,468 | 45% | 100% | 100% | 100% |
| Total | 136,424 | | 123,934 | | 115,445 | | 99% | 99% | 99% |
| Netherlands³ | | | | | | | | | |
| Petroleum products | 2,581 | 4% | 2,221 | 4% | 1,840 | 3% | 88% | 83% | 78% |
| Natural gas | 59,893 | 96% | 56,410 | 96% | 63,432 | 97% | 32% | 32% | 26% |
| Total | 62,474 | | 58,631 | | 65,272 | | 34% | 34% | 27% |
| Italy⁴ | | | | | | | | | |
| Petroleum products | 6,096 | 45% | 5,246 | 44% | 5,971 | 46% | 10% | 12% | 14% |
| Natural gas | 7,580 | 55% | 6,563 | 56% | 6,885 | 54% | 75% | 75% | 74% |
| Total | 13,676 | | 11,809 | | 12,856 | | 46% | 47% | 46% |
| Notes and sources: | | | | | | | | | |
| 1 Primary production: Eurostat Energy Statistics | | | | | | | | | |
| 2 UK EOPS: based on UK Department of Energy and Climate Change | | | | | | | | | |
| 3 NL EOPS: based on NL Ministry of Economics (Oil & Gas Portal) | | | | | | | | | |
| 4 Italy EOPS: based on Ministry of Economic Development – Direction General for Mineral Resources and Energy | | | | | | | | | |

Data availability: value added and employment

As described in the main text, the main 4-digit NACE codes relevant for the oil and gas sector are:

- 06.10 Extraction of crude petroleum.
- 06.20 Extraction of natural gas.
- 09.10 Support activities for petroleum and natural gas extraction.

For both value added (V12150 - Value added at factor cost) and employment (V16110 - Number of persons employed) the Eurostat Structural Business statistics (SBS), most countries only report data on oil and gas production at a 2-digit NACE level (cf. B 06 - Extraction of crude petroleum and natural gas). For supporting activities the situation is mixed, with some countries reporting data at a NACE 4-digit level, while for others data is reported only at the 2-digit NACE level (cf. B 09 - Mining support service activities).

Estimation of value added and employment from offshore oil and gas extraction

Using the above mentioned offshore production shares (EOPS) to provide a key for allocating between offshore and onshore activities⁷, the following estimates can be derived from SBS data:⁸

- **Error! Reference source not found.:** Value added (at factor cost) from offshore extraction of crude petroleum and natural gas (NACE B06).
- **Error! Reference source not found.:** Employment in the offshore extraction of crude petroleum and natural gas (NACE B06).⁹

⁷The same 'keys' are applied for both value added and employment.

⁸On the basis of EU Offshore Authorities Group estimates of total EU offshore oil and gas production, the countries for which Eurostat data are available are believed to account for around 95% of total EU offshore production.

⁹ For the UK and Netherlands, for years for which data is available at a NACE 4-digit level, a separation is made between petroleum extraction and natural gas extraction.

- **Error! Reference source not found.:** Value added (at factor cost) from support activities for offshore petroleum and natural gas extraction.¹⁰
- **Error! Reference source not found.:** Employment in support activities for offshore petroleum and natural gas extraction.¹¹

Aggregating across extraction activities and supporting activities the total value added of the 'core' offshore oil and gas activities is estimated at around € 42 billion and total employment around 70 thousand.¹² These estimates can be compared to estimates reported in the Blue Growth Study (Ecorys 2012) of € 107-133 billion¹³ and 25-50 thousand.

Next steps

Country experts to check:

- Identify further national sources providing data on offshore and onshore production; particularly for larger producers (e.g. Germany, Romania, and Poland) and those where Eurostat data are not available.
- Verify/compare with other (national) sources of information on offshore oil and gas industry.

Table 43 Extraction of crude petroleum and natural gas (NACE B06): estimated value-added of offshore production (2008-10)

| | Total industry value added at factor cost (EUR million) ¹ | | | Estimated offshore production share | | | Estimated offshore value added at factor cost (EUR million) | | |
|---|---|----------|----------|-------------------------------------|------|------|--|-----------------|-----------------|
| | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 |
| | UK | 38,591.3 | 21,213.2 | 26,294.0 | 99% | 99% | 99% | 38,205.4 | 21,001.1 |
| Denmark | 8,192.5 | 4,898.5 | 5,854.8 | 100% | | | 8,192.5 | 4,898.5 | 5,854.8 |
| Netherlands | 7,175.7 | 8,592.7 | 8,608.9 | 34% | 34% | 27% | 2,439.7 | 2,921.5 | 2,324.4 |
| Italy | 4,329.5 | 3,869.5 | 4,353.8 | 46% | 47% | 46% | 1,991.6 | 1,818.7 | 2,002.7 |
| Germany | 1,623.5 | 1,101.4 | 1,168.0 | 45% | | | 730.6 | 495.6 | 525.6 |
| France | 449.7 | 324.1 | 367.4 | 45% | | | 202.4 | 145.8 | 165.3 |
| Spain | 40.0 | 28.5 | 38.9 | 50% | | | 20.0 | 14.3 | 19.5 |
| Lithuania | 42.4 | 26.3 | 36.1 | 50% | | | 21.2 | 13.2 | 18.1 |
| Bulgaria | -10.6 | 6.9 | 11.3 | 50% | | | -5.3 | 3.5 | 5.7 |
| Poland ² | 0.7 | 0.4 | : | 50% | | | 0.4 | 0.2 | 0.2 |
| TOTAL of above | | | | | | | 51,798.4 | 31,312.3 | 36,947.3 |
| Notes and sources: | | | | | | | | | |
| 1 Source: Eurostat SBS (code V12150 - Value added at factor cost) | | | | | | | | | |
| 2 Poland offshore estimate for 2010 based on data for 2009 | | | | | | | | | |

¹⁰ Although it is necessary for many countries to resort to the use of data for 'Mining support service activities' (B09), it appears that in those countries with an important oil and gas industry that 'Support activities for petroleum and natural gas extraction' (B0910) accounts for the overwhelming majority of support activities.

¹¹ Idem.

¹² Concerning employment, it appears that Romania reports level of employment in oil and gas extraction that is disproportionate to its level of production and this has a large impact on the overall EU employment estimate.

¹³ Note: it appears that the Blue Growth Study estimates are based on turnover data and not on value added.

Table 44 Extraction of crude petroleum and natural gas (NACE B06): estimated employment in offshore production (2008-10)

| | Total industry employment (Number of persons employed) ¹ | | | Estimated offshore production share | | | Estimated offshore employment (Number of persons employed) | | |
|--------------------------|---|--------|--------|-------------------------------------|-------|-------|--|---------------|---------------|
| | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 |
| Romania | 38,538 | 35,475 | 30,546 | 50% | | | 19,269 | 17,738 | 15,273 |
| UK ^{2,5} | 13,405 | : | 15,300 | 99% | 99% | [99%] | 13,271 | 14,172 | 15,072 |
| <i>of which: oil</i> | : | : | 14,819 | : | : | 98% | : | : | 14,592 |
| <i>of which: gas</i> | : | : | 481 | : | : | 100% | : | : | 480 |
| Italy | 13,047 | 12,769 | 12,116 | 46% | 47% | 46% | 6,002 | 6,001 | 5,573 |
| Germany | 3,544 | 3,696 | 3,754 | 45% | | | 1,595 | 1,663 | 1,689 |
| Netherlands ⁵ | 3,075 | 3,133 | 3,173 | [40%] | [40%] | [34%] | 1,228 | 1,249 | 1,087 |
| <i>of which: oil</i> | 461 | 495 | 522 | 88% | 83% | 78% | 404 | 412 | 406 |
| <i>of which: gas</i> | 2,614 | 2,638 | 2,651 | 32% | 32% | 26% | 825 | 837 | 681 |
| Denmark | 444 | 523 | 566 | 100% | | | 444 | 523 | 566 |
| France ³ | : | : | 814 | 45% | | | 366 | 366 | 366 |
| Lithuania | 351 | 304 | 252 | 50% | | | 176 | 152 | 126 |
| Spain | 215 | 231 | 242 | 50% | | | 108 | 116 | 121 |
| Bulgaria ⁴ | 44 | : | 37 | 50% | | | 22 | 20 | 19 |
| Poland | 28 | 35 | : | 50% | | | 14 | 18 | 18 |
| TOTAL of above | | | | | | | 42,494 | 42,017 | 39,910 |

Notes and sources:

- 1 Source: Eurostat SBS (code V16110 - Number of persons employed)
- 2 UK offshore estimate for 2009 calculated as mid-point between data for 2008 and 2010.
- 3 France offshore estimate for 2008 and 2009 based on data for 2010
- 4 Bulgaria offshore estimate for 2009 calculated as mid-point between data for 2008 and 2010
- 5 For UK in 2010 and Netherlands (all years) the estimated offshore production share is derived from the outcome of the employment calculations for the sub-components 'oil' and 'natural gas'

Table 45 Support activities for petroleum and natural gas extraction (NACE B091): estimated value-added of offshore production (2008-10)

| | Total industry value added at factor cost (EUR million) ¹ | | | Estimated offshore production share | | | Estimated offshore value added at factor cost (EUR million) | | |
|--------------------------|---|---------|---------|--|------|------|--|----------------|----------------|
| | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 |
| | UK | 3,409.2 | 2,935.5 | 3,750.9 | 99% | 99% | 99% | 3,375.1 | 2,906.1 |
| Netherlands ² | 1,459.0 | 814.1 | 842.4 | 34% | 34% | 27% | 496.1 | 276.8 | 227.4 |
| Denmark ³ | 186.3 | 262.5 | 249.4 | 100% | | | 186.3 | 262.5 | 249.4 |
| Germany ² | 248.7 | 255.1 | 211.0 | 45% | | | 111.9 | 114.8 | 95.0 |
| Romania ⁴ | 693.0 | 143.9 | 175.7 | 50% | | | 346.5 | 72.0 | 87.9 |
| Italy ^{3,7} | : | : | 182.6 | 46% | 47% | 46% | 84.0 | 84.0 | 84.0 |
| Poland | 102.3 | 121.3 | 160.0 | 50% | | | 51.2 | 60.7 | 80.0 |
| France ⁵ | 51.6 | -32.4 | 72.3 | 45% | | | 23.2 | -14.6 | 32.5 |
| Spain ⁶ | 32.3 | 34.0 | 36.4 | 50% | | | 16.2 | 17.0 | 18.2 |
| Lithuania | 0.0 | 0.0 | 0.0 | 50% | | | 0.0 | 0.0 | 0.0 |
| Bulgaria ⁸ | 0.2 | -0.2 | : | 50% | | | 0.1 | -0.1 | 0.0 |
| TOTAL of above | | | | | | | 4,690.5 | 3,779.2 | 4,587.8 |

Notes and sources:

1 Source: Eurostat SBS (code V12150 - Value added at factor cost)

2 Data refer to 'Mining support service activities' (B09)

3 Data for 2010 refer to 'Mining support service activities' (B09)

4 Data for 2009 refer to 'Mining support service activities' (B09)

5 Data for 2008 refer to 'Mining support service activities' (B09)

6 Data for 2008 and 2009 refer to 'Mining support service activities' (B09)

7 Italy offshore estimate for 2008 and 2009 based on data for 2010

8 Bulgaria offshore estimate for 2010 set to zero

Table 46 Support activities for petroleum and natural gas extraction (NACE B091): estimated employment in offshore production (2008-10)

| | Total industry employment (Number of persons employed) ¹ | | | Estimated offshore production share | | | Estimated offshore employment (Number of persons employed) | | |
|--------------------------|--|--------|--------|--|------|------|---|---------------|---------------|
| | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 |
| | UK | 18,489 | 17,360 | 22,879 | 99% | 99% | 99% | 18,304 | 17,186 |
| Romania | 9,882 | 7,337 | 6,267 | 50% | | | 4,941 | 3,669 | 3,134 |
| Denmark ² | 1,716 | 1,967 | 2,098 | 100% | | | 1,716 | 1,967 | 2,098 |
| Poland | 2,181 | 3,096 | 4,082 | 50% | | | 1,091 | 1,548 | 2,041 |
| Germany ³ | 3,522 | 2,779 | 2,862 | 45% | | | 1,585 | 1,251 | 1,288 |
| Netherlands ² | 2,270 | 2,774 | 2,663 | 34% | 34% | 27% | 772 | 943 | 719 |
| Italy ^{2,5} | : | : | 1,616 | 46% | 47% | 46% | 743 | 743 | 743 |
| Spain ⁴ | 224 | 247 | 310 | 50% | | | 112 | 124 | 155 |
| France ⁶ | : | : | 110 | 45% | | | 50 | 50 | 50 |
| Bulgaria ⁷ | : | 10 | 14 | 50% | | | 5 | 5 | 7 |
| Lithuania | 0 | 0 | 0 | 50% | | | 0 | 0 | 0 |
| TOTAL of above | | | | | | | 29,318 | 27,485 | 32,773 |

Notes and sources:

1 Source: Eurostat SBS (code V16110 - Number of persons employed)

2 Data for 2010 refer to 'Mining support service activities' (B09)

3 Data refer to 'Mining support service activities' (B09)

4 Data for 2008 and 2009 refer to 'Mining support service activities' (B09)

5 Italy offshore estimate for 2008 and 2009 based on data for 2010

6 France offshore estimate for 2008 and 2009 based on data for 2010

7 Bulgaria offshore estimate for 2008 based on data for 2009

*Supplementary data on offshore oil and gas production (UK, NL and IT)***Table 47 UK: Crude Oil Production '000 Tonnes (M³*Reported Density) Per Year (UK Share)**

| | 2008 | 2009 | 2010 | 2011 | 2012 | Ave 2008-2010 |
|--------------------------------------|-------------------|-------------------|-------------------|------|------|-------------------|
| Total Crude Oil From Offshore Fields | 65,235,302 | 62,517,694 | 58,860,379 | | | 62,204,458 |
| Total Crude Oil From Land Fields | 1,239,929 | 1,167,743 | 916,152 | | | 1,107,941 |
| Total | 66,475,231 | 63,685,437 | 59,776,531 | | | 63,312,400 |
| Offshore share | 98% | 98% | 98% | | | 98% |

Source: <https://www.gov.uk/oil-and-gas-uk-field-data#page-navigation>**Table 48 UK: Gross gas production in million cubic metres**

| | 2008 | 2009 | 2010 | 2011 | 2012 | Ave 2008-2011 |
|----------------|---------------|---------------|---------------|---------------|------|---------------|
| Total Offshore | 74,840 | 62,939 | 59,592 | 47,762 | | 61,283 |
| Total Onshore | 97 | 93 | 92 | 28 | | 78 |
| Total | 74,937 | 63,032 | 59,684 | 47,790 | | 61,361 |
| Offshore share | 100% | 100% | 100% | 100% | | 100% |

Source: <https://www.gov.uk/oil-and-gas-uk-field-data#page-navigation>**Table 49 NL: OIL PRODUCTION in 1 000 Sm³**

| | 2008 | 2009 | 2010 | 2011 | 2012 | Ave 2008-2010 |
|------------------------------|---------------|---------------|---------------|------|------|---------------|
| Continental Shelf (offshore) | 1841.1 | 1295.7 | 981.7 | | | 1372.8 |
| Rijswijk* (onshore) | 261.3 | 260 | 280.6 | | | 267.3 |
| Total | 2102.4 | 1555.7 | 1262.3 | | | 1640.1 |
| Offshore share | 88% | 83% | 78% | | | 84% |

Source: <http://www.nlog.nl/en/production/production.html>**Table 50 NL: GAS PRODUCTION in million Sm³**

| | 2008 | 2009 | 2010 | 2011 | 2012 | Ave 2008-2010 |
|------------------------------|----------------|----------------|----------------|------|------|----------------|
| Continental Shelf (offshore) | 25224.3 | 23393.1 | 22080.2 | | | 23565.9 |
| Rijswijk* (onshore) | 54734.2 | 50339.2 | 63825.9 | | | 56299.8 |
| Total | 79958.5 | 73732.3 | 85906.1 | | | 79865.6 |
| Offshore share | 32% | 32% | 26% | | | 30% |

Source: <http://www.nlog.nl/en/production/production.html>**Table 51 IT: Oil and petrol production in 1 000 tonnes**

| | 2008 | 2009 | 2010 | 2011 | 2012 | Ave 2008-2012 |
|----------------|--------------|--------------|--------------|--------------|--------------|---------------|
| Total Offshore | 535 | 526 | 695 | 640 | 474 | 574 |
| Total Onshore | 4,708 | 4,047 | 4,410 | 4,669 | 4,923 | 4,551 |
| Total | 5,243 | 4,573 | 5,106 | 5,309 | 5,396 | 5,125 |
| Offshore share | 10% | 12% | 14% | 12% | 9% | 11% |

Source: <http://unmig.sviluppoeconomico.gov.it/unmig/produzione/produzione.asp>

Table 52 IT: Gas production in million Sm3

| | 2008 | 2009 | 2010 | 2011 | 2012 | Ave 2008-2012 |
|----------------|--------------|--------------|--------------|--------------|--------------|---------------|
| Total Offshore | 6,815 | 5,919 | 6,110 | 5,997 | 6,034 | 6,175 |
| Total Onshore | 2,256 | 1,990 | 2,155 | 2,341 | 2,476 | 2,244 |
| Total | 9,070 | 7,909 | 8,265 | 8,339 | 8,511 | 8,419 |
| Offshore share | 75% | 75% | 74% | 72% | 71% | 73% |

Source: <http://unmig.sviluppoeconomico.gov.it/unmig/produzione/produzione.asp>

Table 53 Breakdown of demand (intermediate consumption + GFCF) by product type: ranked by share in total use of the sector 'Extraction Of Crude Petroleum And Natural Gas & Mining Of Metal Ores'

| Rank | Code | Description | Value (GBP million) | Share on total demand by sector | Share of total demand for product |
|------|---------|---|---------------------|---------------------------------|-----------------------------------|
| 1 | 06 & 07 | Extraction Of Crude Petroleum And Natural Gas & Mining Of Metal Ores | 4908 | 30.8% | 7.7% |
| 2 | 25OTHER | Fabricated metal products, excl. machinery and equipment and weapons & ammunition - 25.1-3/25.5-9 | 1865 | 11.7% | 5.4% |
| 3 | 9 | Mining support services | 1634 | 10.2% | 31.7% |
| 4 | 41 | Buildings and building construction works | 764 | 4.8% | 0.7% |
| 5 | 43 | Specialised construction works | 594 | 3.7% | 0.9% |
| 6 | 64 | Financial services, except insurance and pension funding | 592 | 3.7% | 0.5% |
| 7 | 71 | Architectural and engineering services; technical testing and analysis services | 534 | 3.3% | 1.4% |
| 8 | 69.1 | Legal services | 490 | 3.1% | 1.8% |
| 9 | 50 | Water transport services | 452 | 2.8% | 2.8% |
| 10 | 49.1-2 | Rail transport services | 336 | 2.1% | 3.3% |
| 11 | 42 | Constructions and construction works for civil engineering | 293 | 1.8% | 0.8% |
| 12 | 28 | Machinery and equipment n.e.c. | 267 | 1.7% | 0.5% |
| 13 | 78 | Employment services | 247 | 1.5% | 0.7% |
| 14 | 33OTHER | Rest of repair; Installation - 33.11-14/17/19/20 | 236 | 1.5% | 2.0% |
| 15 | 19 | Coke and refined petroleum products | 191 | 1.2% | 0.5% |
| 16 | 35.2-3 | Gas; distribution of gaseous fuels through mains; steam and air conditioning supply | 188 | 1.2% | 0.6% |
| 17 | 69.2 | Accounting, bookkeeping and auditing services; tax consulting services | 181 | 1.1% | 1.4% |
| 18 | 62 | Computer programming, consultancy and related services | 181 | 1.1% | 0.3% |
| 19 | 77 | Rental and leasing services | 172 | 1.1% | 0.6% |
| 20 | 72 | Scientific research and development services | 141 | 0.9% | 1.0% |
| | | <i>Other</i> | 1693 | 10.6% | |
| | | TOTAL | 15959 | 100% | |

Table 54 Breakdown of demand (intermediate consumption + GFCF) by product type: ranked by share of the sector 'Extraction Of Crude Petroleum And Natural Gas & Mining Of Metal Ores' in total demand for the product

| Rank | Code | Description | Value (GBP million) | Share on total demand by sector | Share of total demand for product |
|------|---------|---|---------------------------|------------------------------------|---|
| 1 | 9 | Mining support services | 1634 | 10.2% | 31.7% |
| 2 | 33.15 | Repair and maintenance of ships and boats | 119 | 0.7% | 23.6% |
| 3 | 06 & 07 | Extraction Of Crude Petroleum And Natural Gas & Mining Of Metal Ores | 4908 | 30.8% | 7.7% |
| 4 | 25OTHER | Fabricated metal products, excl. machinery and equipment and weapons & ammunition - 25.1-3/25.5-9 | 1865 | 11.7% | 5.4% |
| 5 | 49.1-2 | Rail transport services | 336 | 2.1% | 3.3% |
| 6 | 50 | Water transport services | 452 | 2.8% | 2.8% |
| 7 | 33OTHER | Rest of repair; Installation - 33.11-14/17/19/20 | 236 | 1.5% | 2.0% |
| 8 | 69.1 | Legal services | 490 | 3.1% | 1.8% |
| 9 | 20A | Industrial gases, inorganics and fertilisers (all inorganic chemicals) - 20.11/13/15 | 129 | 0.8% | 1.6% |
| 10 | 33.16 | Repair and maintenance of aircraft and spacecraft | 36 | 0.2% | 1.6% |
| 11 | 69.2 | Accounting, bookkeeping and auditing services; tax consulting services | 181 | 1.1% | 1.4% |
| 12 | 71 | Architectural and engineering services; technical testing and analysis services | 534 | 3.3% | 1.4% |
| 13 | 72 | Scientific research and development services | 141 | 0.9% | 1.0% |
| 14 | 43 | Specialised construction works | 594 | 3.7% | 0.9% |
| 15 | 42 | Constructions and construction works for civil engineering | 293 | 1.8% | 0.8% |
| 16 | 41 | Buildings and building construction works | 764 | 4.8% | 0.7% |
| 17 | 78 | Employment services | 247 | 1.5% | 0.7% |
| 18 | 30.1 | Ships and boats | 34 | 0.2% | 0.6% |
| 19 | 77 | Rental and leasing services | 172 | 1.1% | 0.6% |
| 20 | 35.2-3 | Gas; distribution of gaseous fuels through mains; steam and air conditioning supply | 188 | 1.2% | 0.6% |
| | | <i>Other</i> | 2606 | 16.3% | |
| | | TOTAL | 15959 | 100.0% | |

4.2 Offshore wind

➔ Definition of the Maritime Economic Activity

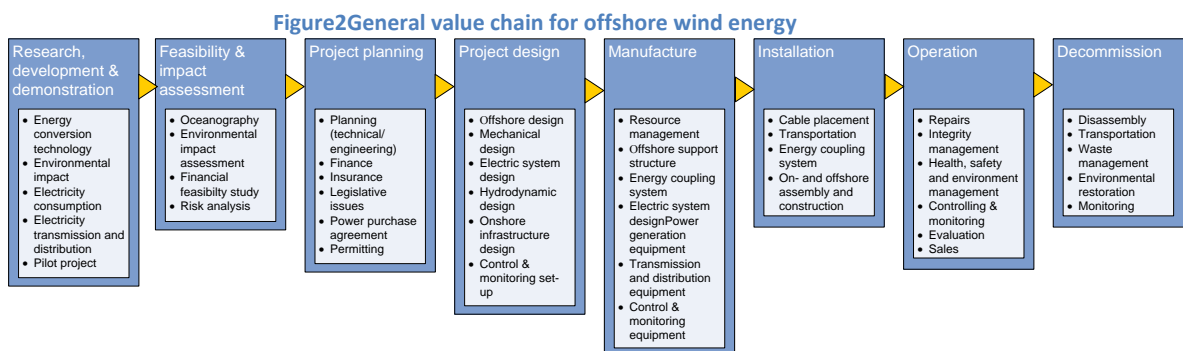
Offshore wind energy refers to wind farms in marine waters, and the conversion of wind energy into electricity. The advantage of constructing these parks offshore is that the wind speeds are higher, and that there is less competition for space with other user functions than on land (though competition is far from absent). Additionally, the more uniform wind speeds mean less wear and tear for the turbines. On the other hand, the offshore environment is harsher and more difficult than on land, due to the high wind speeds, waves and the salty environment. This increases the relative risks, as well as the costs of exploring and developing the necessary technology.¹⁴

So far, offshore wind is the cheapest, and most mature of the offshore renewable energy technologies. It has been the front-runner since the 1990s. Various types of foundations have been developed to cope with the differing water depths and seabed conditions that these offshore wind farms have to cope with.¹⁵

Although offshore wind energy is the most developed of the offshore renewable technologies, it is still an industry in its infancy. There are enough facets which are as yet undiscovered, making it an intriguing and potentially profitable area for new ventures.¹⁶

➔ Description of the value chain

In the value chain, all relevant elements and activities in the whole sector of offshore wind energy are depicted. The value chain as portrayed in the sub-function report, roughly coincides with the life-cycle of the technology:



Source: Ecorys (2011): Maritime Sub-Function Profile Offshore Wind Energy

Given the still limited capacity we propose to focus on the core VGAs of the MEA:

- Production of parts
- Construction
 - Grid
 - Power plant
- Operation

¹⁴Ecorys (2011): Maritime Sub-Function Profile Offshore Wind Energy

¹⁵Ecorys (2011): Maritime Sub-Function Profile Offshore Wind Energy

¹⁶Ecorys (2011): Maritime Sub-Function Profile Offshore Wind Energy

➤ Linking the value chain components to NACE sectors

Linking VGAs and NACE codes for offshore wind energy is very difficult. There are no NACE codes explicitly covering offshore wind. Codes like 28.11 Manufacture of engines and turbines, except aircraft, vehicle and cycle engines definitely cover also the production of turbines for offshore wind energy farms, but the share is unknown. Similar for 42.22 Construction of utility projects for electricity and telecommunications which includes the construction of offshore wind farms and 35.11 Production of electricity, 35.12 Transmission of electricity, 35.13 distribution of electricity, 35.14 Trade of electricity, which includes trade of offshore wind energy. Furthermore the activity is limited to few countries and key players. Therefore we propose not to use NACE sectors and make heroic assumptions on what part could be considered related to offshore wind, but to rely on alternative data sources, including EU wide studies on the sector that contain estimates including the above mentioned value chain components.

➤ Key to allocate data to maritime vs non-maritime

We are aware of the fact that a lot of available studies and estimates include both offshore and onshore wind activities. Therefore it is well likely that we have to distinguish between onshore wind and offshore wind. For this we propose to use data published by the European Wind Energy Association (EWEA) http://www.ewea.org/fileadmin/files/library/publications/statistics/Wind_in_power_annual_statistics_2012.pdf on the amount of capacity (onshore/offshore). The key to estimate offshore wind proposed is the share of offshore wind (of total wind energy capacity) in a certain country.

➤ Key to allocate between sea basins

So far the capacity is limited and mainly focused on certain areas. We therefore propose to make this allocation based on the expertise of country experts.

4.3 Ocean renewable energy

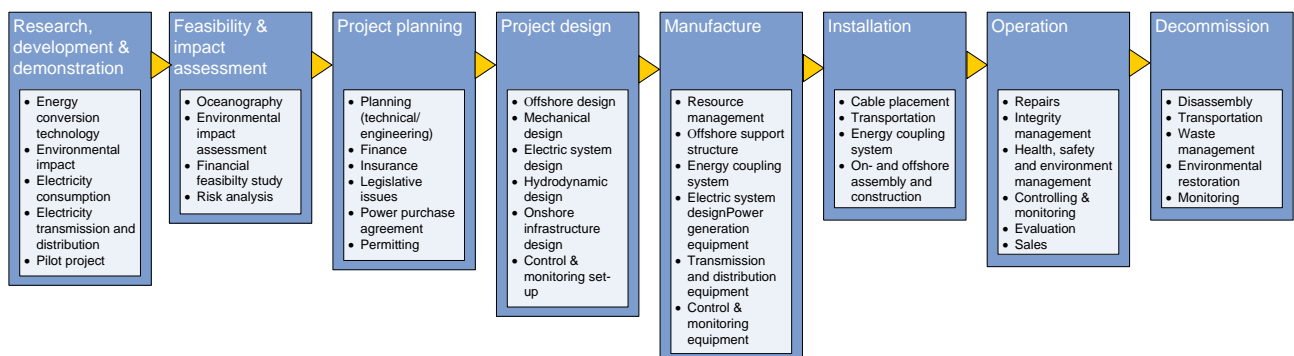
➤ Definition of the Maritime Economic Activity

The MEA ocean renewable energy represents not one single technology. It consists of four types of technologies which are split in various sub-technologies. The four types are: wave, tidal, OTEC, osmotic. Given the low maturity of the development of this MEA, it does not yet exist in a large scale.

Nevertheless, for the wave and tidal sector, a large number of devices are under development across Europe. So far, no particular design has emerged as clear front runner for large scale commercial development. The various technologies are at different stages of development with some prototypes currently being tested at full scale and commercial projects expected in the near future. For OTEC and osmotic power, a limited number of projects are currently being developed with again no clear technological development in sight.¹⁷

➤ Description of the value chain

What we presented as a value chain in the sub-function report should be better defined as a life-cycle:



Source: Maritime Sub-Function Profile Report 3.3 "Ocean Renewable Energy Sources"

Given the early stage of the development we suggest to focus on four core VGAs of this MEA:

- R&D
- Production of parts
- Construction
 - Grid
 - Power plant
- Operation

➤ Linking the value chain components to NACE sectors

Linking VGAs and NACE codes for ocean renewable energy is very difficult. There are no NACE codes explicitly covering ocean renewable energy. Codes like 28.11 Manufacture of engines and turbines, except aircraft, vehicle and cycle engines definitely cover also the production of turbines for ocean renewable energy power plants, but the share is unknown. Similar for 42.22 Construction of utility projects for electricity and

¹⁷ Ecorys (2011): Maritime Sub-Function Profile Report 3.3 "Ocean Renewable Energy Sources"

telecommunications which includes the construction of ocean renewable energy power plants and 35.11 Production of electricity, 35.12 Transmission of electricity, 35.13 distribution of electricity, 35.14 Trade of electricity, which includes production of ocean renewable energy. Furthermore the activity is limited to few countries and key players. Therefore instead of trying to mechanically calculate what would be the part of these sectors relevant to Ocean Renewable Energy, we propose to rely on alternative sources outside Eurostat.

➔ Key to allocate NACE data to maritime vs non-maritime

Ocean energy is per definition maritime.

➔ Key to allocate NACE data to MEAs

In the case that data sources provide information on Ocean energy also including other energy sectors (offshore, e.g. wind, or onshore), a split may be needed. To define the share of codes we propose to assume that in the long run for employment and GVA all electricity sources can be seen as similarly profitable and similarly labour intensive (even though we are aware of the fact that in the short run, due to the different stages of maturity, this is not the case). We can therefore use the installed capacity of MW as a proxy to calculate the share for specific energy sources. Eurostat provides data on "Infrastructure - electricity - annual data [nrg_113a]". There is a indicator "Electrical capacity, main activity producers - Tide, wave and ocean". Using the share of this indicator from the total can be used as an indicator of the share of employment and GVA for the given NACE codes.

Data needed is not always complete and will need to be completed by national sources or associations.

➔ Key to allocate between sea basins

Ocean renewable energy is so far limited to very few sites. It can therefore be allocated to the sea basins according to its installation location based on national data or expert opinions.

4.4 Carbon capture and storage

➔ Definition of the Maritime Economic Activity

Carbon capture and storage is a technology to capture and store CO₂ released during the burning of fossil fuels, or as a result of industrial processes such as making cement, steel or in the chemical industry. There is already considerable experience with injecting carbon dioxide deep underground for storage at a number of industrial-scale CCS projects.¹⁸

The purpose of this technology is to mitigate the contribution to Climate change of carbon intensive industries.

➔ Description of the value chain

CCS is still in its development stage. There are many reasons to expect it to become a successful technology, but so far it has not been put in place in many occasions. The core parts of the value chain for CCS consist of the production of the CCS technology, the installation and the maintenance.

➔ Linking the value chain components to NACE sectors

As the technology is so immature, it is practically impossible to allocate it to NACE codes. Therefore estimates will need to rely on European or national sector related sources or on bottom-up specific studies (as per the BG study).

¹⁸ CSS Association: <http://www.ccsassociation.org>

4.5 Aggregates mining

➔ Definition of the Maritime Economic Activity

This MEA covers extraction of marine aggregates (sands and gravels) from the seabed.

➔ Description of the value chain

The value chain of the marine aggregates MEA is not described in Ecorys (2012)¹⁹. Essentially the value chain consists of:

- Extraction of marine aggregates (dredging)
- Processing of aggregates (e.g. at wharfs)
- Downstream activities:
 - Manufacture of products (e.g. concrete)
 - Final demand (e.g. construction sector)
- Ancillary services:
 - Exploration services
 - Shipbuilding and repair
 - Transport services

➔ Linking the value chain components to NACE sectors

Table 55 provides an overview of the NACE codes that relevant for principal maritime (offshore) value-added generating activities of the marine aggregates sector.

Table 55 Overview of main NACE codes for principal value-added generating activities (VGA) of the offshore oil and gas sector

| NACE Rev. 2 code – Economic activity | Type | Corresponding MEA value chain components (VGA) | Comments |
|---|------|--|--|
| 08.12 Operation of gravel and sand pits; mining of clays and kaolin | S | Production / operations | Requires a separation between offshore and onshore activities |
| 09.90 Supporting activities for other mining and quarrying | S | Production / operations Processing (offshore) | Requires a separation between offshore and onshore activities and between gravel & sand vs other mining sectors. |
| 30.11 Building of ships and floating structures | P | Ancillary | Disregarded but assessed as a separate sector outside MEAs |
| 33.15 Repair and maintenance of ships and boats | P | Ancillary | Disregarded but assessed as a separate sector outside MEAs |
| 50.20 Sea and coastal water transport | P | Ancillary | Disregarded here but assigned fully to MEA 1.1 deep-sea and 1.2 short-sea |
| 71.12 Engineering activities and related technical consultancy | T | Ancillary | Disregarded here |
| 38.31 Dismantling of wrecks | T | Decommissioning | Disregarded as largely non-maritime and not possible to identify relevant share (assumed very small) |

¹⁹Ecorys (2012), 'Blue Growth: Scenarios and Drivers for Sustainable Growth from Oceans, Seas and Coasts', together with the accompanying 'Maritime Sub-Function Profile Report: Offshore oil and natural gas (3.1)'.

➤ Key to allocate NACE data to maritime vs non-maritime

Ecorys (2012)²⁰ notes that Eurostat data for this MEA are incomplete. The study provides an estimate of GVA of € 0.6 billion and employment of 4.3 thousand (based on extrapolation from UK data).

Data on the volume of marine aggregate extraction exist from various sources:

- UEPG²¹: 'Best estimates of aggregates production data by country'. UEPG indicate that marine aggregates account for 2% of total European aggregates production. Data for individual countries and corresponding shares of total production volumes are shown in Table 56. This source has also been applied previously by COGEA for analysing the sector in Italy and Slovenia.
- ICES²²: 'Summary data on national aggregate extraction' available in the annual reports of the 'Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem'. See, for example, Table 57.
- Various national sources.

Table 56 Marine aggregates production by country (main EU countries with marine aggregate extraction activities)

| | Marine aggregates (million tonnes) | | | Total aggregates (million tonnes) | | | Marine share of total aggregates production | | |
|-----------------------|---------------------------------------|-----------|-----------|--------------------------------------|--------------|--------------|--|-----------|-----------|
| | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 |
| Belgium | 4 | 3 | 8 | 72 | 78 | 82 | 6% | 4% | 10% |
| Denmark | 5 | 9 | 9 | 58 | 44 | 49 | 9% | 20% | 18% |
| France | 7 | 6 | 6 | 432 | 376 | 365 | 2% | 2% | 2% |
| Germany | 11 | 5 | 9 | 563 | 555 | 535 | 2% | 1% | 2% |
| Netherlands | 54 | 45 | 17 | 124 | 113 | 76 | 44% | 40% | 22% |
| UK | 12 | 10 | 10 | 243 | 197 | 226 | 5% | 5% | 4% |
| Total of above | 93 | 78 | 59 | 1,492 | 1,363 | 1,333 | 6% | 6% | 4% |
| Other EU27 | : | : | : | 1,593 | 1,425 | 1,453 | : | : | : |
| Total EU27 | 93 | 78 | 59 | 3,085 | 2,788 | 2,786 | 3% | 3% | 2% |

Source: UEPG (<http://www.uepg.eu/statistics/estimates-of-production-data>)

²⁰Ecorys (2012), 'Blue Growth: Scenarios and Drivers for Sustainable Growth from Oceans, Seas and Coasts', Annex 1: maritime economic activities data.

²¹Union Européenne des Producteurs de Granulats (European Aggregates Association). Production statistics available at <http://www.uepg.eu/statistics/estimates-of-production-data>

²²International Council for Exploration of the Sea.

Table 57 Marine aggregates production by type (use), country and marine area (2010) in 1000 M³

| | Construction / Industrial aggregates | Beach replenishment | Construction fill / land reclamation | Non aggregate | Total extracted | Aggregate exported |
|------------------|--------------------------------------|---------------------|--------------------------------------|---------------|-----------------|--------------------|
| Belgium | 1,841 | 336 | 0 | 0 | 2,176 | N/d |
| Denmark (HELCOM) | 1,500 | 100 | 6,400 | 1 | 2,200 | 250 |
| Denmark (OSPAR) | 1,200 | 2,300 | 800 | | 4,300 | |
| France (OSPAR) | 7,231 | 0 | 0 | 481 | 7,712 | 0 |
| France (Med) | 0 | N/d | N/d | 0 | N/d | N/d |
| Germany (HELCOM) | 1,533 | 986 | 0 | N/d | 2,522 | N/d |
| Germany (OSPAR) | 60 | 834 | N/d | N/d | 895 | N/d |
| Lithuania | N/d | 110 | N/d | N/d | 110 | N/d |
| Netherlands | 2,800 | 22,050 | 97,683 | 227 | 122,532 | 2,222 |
| Portugal (OSPAR) | 134 | 0 | 0 | 0 | 134 | 0 |
| Spain (OSPAR) | 0 | 207 | 0 | 0 | 207 | 0 |
| Spain (Med) | 0 | 965 | 0 | 0 | 965 | 0 |
| UK (OSPAR) | 5,987 | 450 | 135 | 0 | 9,700 | 3,128 |

Source: ICES (2011)²³

One problem is that the NACE category (08.12) covers not only operation of gravel and sand pits (including dredging of sand and gravel) but 'mining of clays and kaolin'. There appears to be no available data source that provides comparable data on production of 'sand and gravel' and 'clays and kaolin'.²⁴ Nonetheless, it appears that production of 'clays and kaolin' accounts for only a very small proportion of NACE 08.12. Hence we propose to keep the entire sector.

It is even more problematic to develop an indicator of the share of supporting activities for other mining and quarrying (NACE 09.90) that may be related to marine aggregates.

²³ICEST WGEXT Report 2011, downloaded from : <http://archimer.ifremer.fr/doc/00134/24571/22600.pdf>

²⁴Some comparative data on kaolin production volumes is available from euromines (see: <http://www.euromines.org/mineral/Kaolin>) based on data from the Austrian Federal Ministry for Economy, Family and Youth (see the publication World Mining Data, available at: <http://www.en.bmwfj.gv.at/Energy/MineralRawMaterials/Seiten/default.aspx>).

Specifically, NACE 09.90 covers all supporting activities to mining and quarrying, except for those activities related to petroleum and natural gas extraction (i.e. NACE 09.90 also covers activities related to mining/quarrying of coal, metal ores, and ornamental and building stone). *No key to allocate between maritime versus non-maritime is proposed for this NACE code.* The key to allocate between 08.12 sand and gravel vs other mining sectors will be based on the total GVA of these sectors (onshore and offshore together). For this, we use the data for the following NACE sectors related to mining:

- 05.10 Mining of hard coal
- 05.20 Mining of lignite
- 07.10 Mining of iron ores
- 07.21 Mining of non-ferrous metal ores
- 08.12 Operation of gravel and sand pits; mining of clays and kaolin
- 08.93 Extraction of salt

Baseline estimation of maritime share of 'Operation of gravel and sand pits etc.' (NACE 08.12)

Applying the marine share estimates (see Table 56) to Eurostat data for the sector 'Operation of gravel and sand pits' (NACE 08.12), Table 58 and Table 59 provide baseline estimates for value added and employment in the marine aggregates sector. For the covered countries, these calculations indicate a total value added of only circa € 110 million and a total employment of circa 1.4 thousand.

The above estimates are lower than those from the Blue Growth Study (Ecorys 2012). However, considering that UEPG estimate that the combined turnover of the European Aggregates sector is around € 20 billion, then this would suggest that the turnover of the marine aggregates sector – representing 2% of supply – amounts to around € 400 million. Further, based on Eurostat estimates²⁵, the share of gross value added in industry turnover for the industry (NACE 08.12) is around 30 to 40%. This suggests a value added figure for the marine aggregates sector of around € 140 million, which is not that far from the estimated figure in Table 58.

²⁵Average for DE, DE, DK, NL, UK.

Table 58 Operation of gravel and sand pits etc (NACE B08.12): estimated value-added of offshore production (2008-10)

| | Total industry value added at factor cost (EUR million) ¹ | | | Estimated offshore (marine) share ² | | | Estimated offshore value added at factor cost (EUR million) | | |
|--------------------------|--|--------|--------|--|------|------|---|------------|------------|
| | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 |
| Belgium ³ | : | 86.2 | 95.1 | 6% | 4% | 10% | 3 | 3 | 9 |
| Denmark | 101.1 | 74.2 | 51.3 | 9% | 20% | 18% | 9 | 15 | 9 |
| France | 1740.3 | 1753.6 | 1734.2 | 2% | 2% | 2% | 28 | 28 | 29 |
| Germany | 1219.7 | 950.6 | 1090.8 | 2% | 1% | 2% | 24 | 9 | 18 |
| Netherlands ⁴ | : | : | : | 44% | 40% | 22% | 45 | 34 | 18 |
| UK | 647.2 | 448.6 | 520.4 | 5% | 5% | 4% | 32 | 23 | 23 |
| Total of above | | | | | | | 141 | 111 | 106 |

1. Source: Eurostat SBS (code V12150 - Value added at factor cost)
2. Based on estimated share of total aggregates production (see Table 56, above)
3. Belgium offshore estimate for 2008 based on data for 2009
4. Netherlands offshore estimate calculated under the assumption of average value added per person employed of € 100 thousand for 2008 and € 92 thousand for 2009 and 2010. These amount reflect the 'typical' (average) value added per person employed found for BE, DK, DE and UK.

Table 59 Operation of gravel and sand pits etc (NACE B08.12): employment in offshore production (2008-10)

| | Total industry employment (Number of persons employed) ¹ | | | Estimated offshore (marine) share ² | | | Estimated offshore employment (Number of persons employed) | | |
|--------------------------|---|--------|--------|--|------|------|--|--------------|--------------|
| | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 | 2008 | 2009 | 2010 |
| Belgium ³ | : | 545 | 640 | 6% | 4% | 10% | 21 | 21 | 62 |
| Denmark | 826 | 729 | 546 | 9% | 20% | 18% | 71 | 149 | 100 |
| France ⁴ | : | : | 19,595 | 2% | 2% | 2% | 322 | 322 | 322 |
| Germany | 16,911 | 15,501 | 16,252 | 2% | 1% | 2% | 330 | 140 | 273 |
| Netherlands ⁴ | 1,030 | 918 | 852 | 44% | 40% | 22% | 449 | 366 | 191 |
| UK | 10,152 | : | 9,206 | 5% | 5% | 4% | 501 | 454 | 407 |
| Total of above | | | | | | | 1,695 | 1,452 | 1,356 |

1. Source: Eurostat SBS (code V16110 - Number of persons employed)
2. Based on estimated share of total aggregates production (see Table 56, above)
3. Belgium offshore estimate for 2008 based on data for 2009
4. France offshore estimate for 2008 and 2009 based on data for 2010
5. UK offshore estimate for 2009 calculated as mid-point between data for 2008 and 2010.

➔ Key to allocate between sea basins

ICES (see above) provides data broken down by main sea basins for the countries bordering multiple sea basins (see table 3 above). Country experts should verify these data with statistics at a national level.

➔ Cross-checks with other sources

- Compare results with estimates from sector sources at European or national level providing data on offshore and onshore production; particularly for larger producers (and those where Eurostat data are not available). For example:
 - UK: British Marine Producers Association (<http://www.bmapa.org/>) ; The Crown Estates (<http://www.thecrownestate.co.uk/>); DEFRA (<http://chartingprogress.defra.gov.uk/chapter-5-productiveseas>)²⁶
 - BE: Belgian Ministry of Economies (http://economie.fgov.be/en/entreprises/particular_domains/Marine_sand_and_gravel_extraction/); MUMM (<http://www.mumm.ac.be/EN/Management/Sea-based/sandgravel.php>)
- Verify/compare baseline estimates with other (national) sources of information on marine aggregates.

²⁶ See, also, the productive seas feeder report for mineral extraction (http://chartingprogress.defra.gov.uk/feeder/Section_3.8_Mineral_Extraction.pdf)

4.6 Marine minerals mining

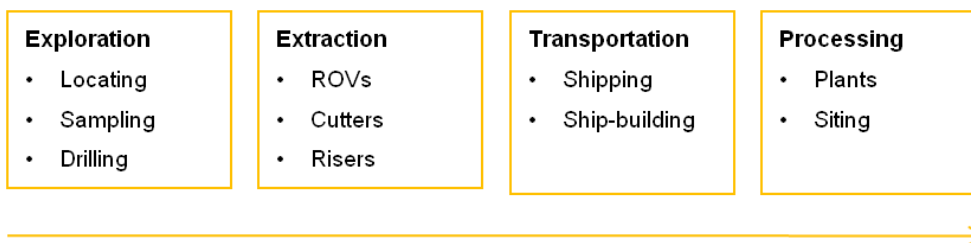
➤ Definition of the Maritime Economic Activity

Marine mineral resources in this paper are (based on the BG study) understood as all raw materials found on and under the seabed, excluding fossil fuels (oil, gas and methane hydrates), phosphorates, and renewable energy sources such as seafloor hot-springs. We also exclude aggregate mineral resources such as sand, gravel and crushed rock which are part of MEA 3.5 Aggregates mining.²⁷

The deposits of marine minerals can be divided into three categories: (1) polymetallic sulphurs, (2) ferromanganese crusts, (3) (ferro)manganese nodules, and (4) rare earth elements and yttrium, and. They differ in composition, shape and location.²⁸

➤ Description of the value chain

Figure 3 Value-chain of deep-sea mining



Source: Based on Birney et al. (2006)

The value-chain of deep-sea mining as described in the sub-function report consists of four main steps:

1. In the **Exploration phase**, different techniques for locating and testing ore content and quality is carried out through locating, sampling and drilling,
2. In the **Extraction phase**, ROVs, cutters and risers are used to carry the ore from the bottom up to the surface,
3. In the **Transportation phase**, shipping and ship-building is in focus; and finally,
4. In the **Processing phase**, the extraction of minerals in plants is carried out. Here also the site plays a key role.²⁹

➤ Linking the value chain components to NACE sectors

Linking VGAs of marine minerals mining to NACE codes is very difficult as the sector is still very small and not defined by single NACE codes. We therefore propose not to rely on NACE codes but on European or national data if available, and (most likely) on sector studies or investigations that need to be identified by the country experts.

²⁷ Ecorys (2011): Blue Growth Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts "Marine mineral resources"

²⁸ Ecorys (2011): Blue Growth Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts "Marine mineral resources"

²⁹ Ecorys (2011): Blue Growth Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts "Marine mineral resources"

➔ Key to allocate NACE data to maritime vs non-maritime

We propose to rely on national data if available or (more likely to be the case) use sector specific studies possibly at MS level (as per BG study).

➔ Key to allocate between sea basins

If national data is available for this MEA, it might also demonstrate the geographic location of marine minerals mining in the relevant country. If this data is not available we propose to rely on expert opinions.

4.7 Securing fresh water supply (desalination)

➔ Definition of the Maritime Economic Activity

Traditional desalinisation processes are based on thermal processes, using vacuum distillation (boiling of water at low pressure). A major technique used in this respect is multi-stage flash (MSF) distillation. The principal competing technique at this moment uses semi-permeable membranes and pressure to separate salts from water, this is called reverse osmosis. Reverse osmosis plant membrane systems use less energy than thermal distillation. The share of the thermal market has fallen due to a growth of membrane markets. At this moment, the market share of reverse osmosis is 61% and that of multi stage flash distillation 26%.³⁰

➔ Description of the value chain

Desalination has a relatively limited value chain, as it mainly involves the manufacturing of fresh water out of marine resources. This has subsequently to be distributed through regular utility companies. The biggest share in cost of the entire plant is its manufacture. The cost of converting seawater to fresh water has been influenced mainly by the energy cost and production cost. It is followed by operation and maintenance³¹.

➔ Linking the value chain components to NACE sectors

The MEA is of very small scale and therefore difficult to be linked to NACE sectors. There is one code specifically mentioning “desalting of sea or ground water to produce water as the principal product of interest”, 36.00 Water collection, treatment and supply. The problem is that this code also covers the collection of rain water, the purification of water for water supply purpose, the treatment of water for industrial and other purposes, the distribution of water through mains, by trucks or other means and the

³⁰ Ecorys (2011): Blue Growth

Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts Maritime Sub-Function Profile “Securing Fresh Water Supply (Desalination)”

³¹ www.hkc22.com/waterdesalination.html, quote in Ecorys (2011): Blue Growth

Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts Maritime Sub-Function Profile “Securing Fresh Water Supply (Desalination)”

operation of irrigation canals. Therefore the share of desalination is expected to be very low.

| VGA | NACE code | Type | Comments |
|---------------------|--|------|--|
| Construction | ? | | |
| Operation | 36.00 Water collection, treatment and supply | S | Only small share is expected to be desalination. Key needed to define share. Proposed to assess the share of "Desalination" and allocate this share to 36.00. |
| Transport | ? | | |

Source: Ecorys

The MEA is very small and it is very difficult to define keys to allocate certain NACE codes to the VGAs. Potentially we could use data provided by the Global Water Intelligence provided in the "Global Water Market 2011" report on the capacity of desalination to calculate the share of NACE code 36.00 to estimate the amount of persons employed and the GVA in this MEA.

In the GWM report, a specific fiche is available for each Country. Each fiche ends with a table Market forecast data, 2007-2016, whose first section is dedicated to "Utility water capital expenditure". It is proposed to calculate the share of "Seawater and brackish water desalination" over "Total drinking water utility capex" for each year in question (2008-2009-2010) and apply these percentages to 36.00, both to GVA and Number of persons employed.

5. Leisure, working and living

5.1 Coastal tourism

➤ Definition of the Maritime Economic Activity

Coastal tourism includes all shore based sea related tourist and recreational activities. In general, tourism is one of the pillars of the economy of the coastal region. However, not all tourism can be categorised as coastal related tourism. Tourism and recreation activities are not always confined to the coastal environment. Also, it should be pointed out that not all tourism in coastal regions is sea related. For many recreational and tourist activities that take place in the coastal area proximity of the sea is not a condition.³²

Tourism as such is not defined as an economic sector in statistics. Rather, use is made of different services sectors identified under the NACE code system such as hotels and accommodation, restaurants, transport services, tour operators, etc. We define coastal tourism as follows: Coastal tourism covers beach-based recreation and tourism (e.g. swimming, surfing, sun bathing), and non-beach related land-based tourism in the coastal area (all other tourism and recreation activities that take place in the coastal area for which the proximity of the sea is a condition).³³

➤ Description of the value chain

Tourism is a broad industry as it contains attractions and transport, travel organisers and local tourist offices. Moreover, different target groups (e.g. business travellers, leisure tourists, etc.) are served. The tourism industry is also characterised by a geographically dispersed value chain:

- On the one hand, suppliers of tourism products and services – often SMEs – are mainly located in the tourist destination itself.
- On the other hand, the demand side consists of a very heterogeneous group of consumers.

In between we find the intermediaries who bundle, pack and promote the tourism product and make it available to tourists. The intermediaries are located in the tourists' country of origin.³⁴ In addition to the VGAs mentioned in the BG study we also see that construction is an important but hard to quantify VGA for this sector.

➤ Linking the value chain components to NACE sectors

The following table shows the linkage between VGAs and NACE codes. As most statistics do not distinguish between maritime tourism and non-maritime tourism, most codes are

³² Ecorys (2012): Interim Report of the Blue Growth study on Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts

³³ Ecorys (2013): Not published Interim Report on the Study in support of Impact Assessment work for maritime and coastal tourism

³⁴ Ecorys (2012): Interim Report of the Blue Growth study on Scenarios and drivers for Sustainable Growth from the Oceans, Seas and Coasts

part of the secondary or tertiary category. Therefore keys to split between coastal and non-coastal are necessary in this MEA. The keys should underline the geographic definition of the sector.

| VGA | NACE code | Type | Comment |
|--|---|--|---|
| Provisioning of travel | 79.11 Travel agency activities | S | Proposed to ignore, as it would be impossible to determine how much of the value added generated can be attributed to the geographic level of analysis. |
| | 79.12 Tour operator activities | S | Proposed to ignore, as it would be impossible to determine how much of the value added generated can be attributed to the geographic level of analysis. |
| | 79.90 Other reservation service and related activities | S | Proposed to ignore, as it would be impossible to determine how much of the value added generated can be attributed to the geographic level of analysis. |
| Operators (accommodation, rental, attraction services) | 55.10 Hotels and similar accommodation | S | Code needs to be split between maritime and non-maritime |
| | 55.20 Holiday and other short-stay accommodation | S | Code needs to be split between maritime and non-maritime |
| | 55.30 Camping grounds, recreational vehicle parks and trailer parks | S | Code needs to be split between maritime and non-maritime |
| | 55.90 Other accommodation | S | Code needs to be split between maritime and non-maritime |
| | 56.10 Restaurants and mobile food service activities | T | Proposed to ignore as majority is non-maritime |
| | 56.21 Event catering activities | T | Proposed to ignore as majority is non-maritime |
| | 56.29 Other food service activities | T | Proposed to ignore as majority is non-maritime |
| | 56.30 Beverage serving activities | T | Proposed to ignore as majority is non-maritime |
| | 68.10 Buying and selling of own real estate | T | Proposed to ignore as majority is non-maritime or non- tourism |
| | 68.20 Renting and operating of own or leased real estate | T | Proposed to ignore as majority is non-maritime or non- tourism |
| | 68.31 Real estate agencies | T | Proposed to ignore as majority is non-maritime or non- tourism |
| | 81.10 Combined facilities support activities | T | Proposed to ignore as majority is non-maritime or non- tourism |
| | 91.02 Museums activities | T | Proposed to ignore as majority is non-maritime or non- tourism |
| | 91.03 Operation of historical sites and buildings and similar visitor attractions | T | Proposed to ignore as majority is non-maritime or non- tourism |
| 91.04 Botanical and zoological | T | Proposed to ignore as majority is non-maritime | |

| VGA | NACE code | Type | Comment |
|---|---|------|---|
| | gardens and nature reserves activities | | or non- tourism |
| | 93.11 Operation of sports facilities | T | Proposed to ignore as majority is non-maritime |
| | 93.12 Activities of sport clubs | T | Proposed to ignore as majority is non-maritime |
| | 93.13 Fitness facilities | T | Proposed to ignore as majority is non-maritime |
| | 93.19 Other sports activities | T | Proposed to ignore as majority is non-maritime |
| | 93.21 Activities of amusement parks and theme parks | S | Proposed to ignore as no data available on Eurostat and not primarily maritime. |
| | 93.29 Other amusement and recreation activities | S | Proposed to ignore as no data available on Eurostat and not primarily maritime. |
| Retail tourist activities provisioning | ? | T | Proposed to ignore as majority is non-maritime |
| Transport | 49.10 Passenger rail transport, interurban | T | Proposed to ignore as majority is non-maritime and non-leisure |
| | 49.31 Urban and suburban passenger land transport | T | Proposed to ignore as majority is non-maritime and non-leisure |
| | 49.32 Taxi operation | T | Proposed to ignore as majority is non-maritime and non-leisure |
| | 49.39 Other passenger land transport n.e.c. | T | Proposed to ignore as majority is non-maritime and non-leisure |
| | 51.10 Passenger air transport | T | Needs to be divided among all MEA within the function "Leisure, working and living". Also large part non-maritime and non-leisure. Propose to split only between coastal tourism and cruise tourism as an estimation to yachting and marinas is not possible. |
| Marketing | ? | T | Proposed to ignore as majority is non-maritime and non-leisure |
| Finance | ? | T | Proposed to ignore as majority is non-maritime and non-leisure |
| IT | ? | T | Proposed to ignore as majority is non-maritime and non-leisure |
| Retail services | ? | ? | Proposed to ignore as majority is non-maritime and non-leisure |
| Construction | 41 Construction of buildings | T | Proposed to ignore. This VGA was not part of the value chain described in the BG study. Nevertheless, the whole construction sector has an impact on employment and GVA in the function which should not be underestimated. Nevertheless it is practically impossible to find proper keys to estimate the "true" size of these indicators depending on construction activities. |
| | 42 Civil engineering | T | |
| | 43 Specialised construction activities | T | |

While most of the above NACE codes are being disregarded, the remaining sectors still need to be divided into maritime and non-maritime

➔ Key to allocate NACE data to maritime vs non-maritime

In the BG study, instead of using Eurostat data, we used the 2008 PRC report with figures from 2006 as a basis for estimations on employment in coastal tourism. These numbers might still be adaptable for estimations on the current size of the MEA, but will lose preciseness over time, as the 2008 PRC study is not annually replicated, while it also does not make clear the underlying data used. As the aim of the development of a methodology for this study is to provide an approach which is replicable over a longer time period we propose to use a key based on data regularly updated by Eurostat.

There are two potential keys to distinguish between maritime and non-maritime which could be used across all VGAs: % of tourist nights spent in coastal NUTS-2 regions compared to the total – by MS; % of beds available in coastal NUTS-3 regions. While the second option (% of beds) is the geographically more precise one, the first option (% of nights spent) takes into account seasonality which has a large effect on employment in coastal regions. We therefore propose to use % of total nights spent in coastal NUTS-2 regions in collective tourist accommodation establishments. The problem with bed capacity is that it is stable over the year even though it does not reflect occupation rates of beds. If e.g. July and August are fully booked and nobody arrives throughout the year, there is only staff needed for these two month.

A possible solution could be to combine both datasets, in order to calculate the number of nights spent at NUTS-3 level, although this is currently not available through EUROSTAT. These can be done in three steps:

- 1- Collect the number of nights spent in a given NUTS-2 region ([Link](#));
- 2- Collect the number of bed-places available for all the NUTS-3 regions within the given NUTS 2 region ([Link](#));
- 3- Attribute a number of nights spent at NUTS-3 level to each NUTS-2 region, based on the respective share on beds available;
- 4- Aggregate resulting “nights spent at NUTS 3” only for maritime NUTS 3

E.g.:

- 1- Number of nights spent in “Hotels and similar establishments” in Sicily, in 2010: **11.243.531**
- 2- Number of **bed places** in “Hotels and similar establishments” in all NUTS 3 regions of Sicily:
 - a. Trapani: 16.026 (13,08%)
 - b. Palermo: 28,506 (23,26%)
 - c. Messina: 30,299 (24,72%)
 - d. Agrigento: 12,281 (10,02%)
 - e. Caltanissetta: 1.912 (1,56%)
 - f. Enna: 1.630 (0,13%)
 - g. Catania: 13.152 (10,73%)
 - h. Ragusa: 9.793 (7,99%)
 - i. Siracusa: 10.420 (8,50%)

TOTAL Sicily: 124.019 (100%)

- 3- Assign the number of nights spent at NUTS-2 level to each NUTS-3 according to the percentages obtained in step 2:
- a. Trapani= 11.243.531 (nights spent) * 13,08% = 1.470.305,08
 - b. Palermo= 11.243.531 (nights spent) * 23,36% = 2.615.282,45
 - c. Messina= 11.243.531 (nights spent) * 24,72% = 2.779.781,20
 - d. Agrigento= 11.243.531 (nights spent) * 10,02 = 1.126.720,12
 - e. Caltanissetta= 11.243.531 (nights spent) * 1,56% = 175.416,41
 - f. Enna= 11.243.531 (nights spent) * 0,13% = 14.954,43
 - g. Catania= 11.243.531 (nights spent) * 10,73% = 1.206.630,00
 - h. Ragusa= 11.243.531 (nights spent) * 7,99% = 898.458,61
 - i. Siracusa= 11.243.531 (nights spent) * 8,50 = 955.982,71

If we aggregate data from step 3 only as regards coastal NUTS 3, we'll have the number of nights spent in coastal NUTS 3 of the region.

Eurostat provides a list of coastal NUTS3 regions annexed to http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Coastal_region_statistics in excel form "Focus on coastal regions: tables and figures" also defining sea basin allocation of these regions. Our definition for "NUTS-2 coastal regions" is as follows: "All NUTS-2 regions which cover at least one NUTS-3 coastal region"

Therefore:

- Landlocked NUTS 2 will not be taken into account;
- Landlocked NUTS 3 of coastal NUTS 2 will not be taken into account.

The whole operation should be repeated for every coastal NUTS 2 in the country. At the end of it, it will be possible to determine the share of nights spent in coastal region vs the share of night spent in the whole country. That share will be applied to the four NACE considered to determine the weight of coastal tourism over the national total

The approach can only be followed if the required information at both NUTS-2 and NUTS-3 level is available.

All the 4 NACE considered will be allocated to costal tourism.

Key to allocate between sea basins

The methodology proposed for allocating NACE to maritime activities allows to achieve information needed at NUTS 2 and NUTS 3 levels. EUROSTAT allocation will be taken as reference for this purpose ([Link](#))

5.2 Yachting and marinas

➔ Definition of the Maritime Economic Activity

This MEA is strongly interlinked with 4.1 Coastal tourism. It can be defined as coastal tourism including the use of yachts and other pleasure boats excluding cruise.

➔ Description of the value chain

The value chain for yachting and marinas consists of three core VGAs:

- Shipbuilding and marine equipment
- Port services and logistics
- Maritime works – constructing ports, maintaining access channels

➔ Linking the value chain components to NACE sectors

The following table provides the link between the core activities and NACE codes.

| VGA | NACE code | Type | Comments |
|--|---|------|---|
| Shipbuilding and marine equipment | 30.12 Building of pleasure and sporting boats | P | Proposed to be allocated 100 % to 0.1 Shipbuilding. |
| | 33.11 Repair and maintenance of ships and boats | P | Proposed to be allocated 100 % to 0.1 Shipbuilding. |
| Port services and logistics | 52.22 Service activities incidental to water transportation | P | Already included in MEAs on maritime transport |
| Maritime works – constructing ports, maintaining access channels | 42.91 Construction of water projects | P | Already included in category 'other sectors' |

The above implies that it is considered useful to explore other sources (e.g. outside NACE statistical data) on estimates for the overall size of the MEA. This should be done at country level, possibly through sector organisations.

➔ Key to allocate NACE data to maritime vs non-maritime

Not applicable

➔ Key to allocate NACE data to MEAs

The availability of specific sector reports at Country level should be checked.

➔ Key to allocate between sea basins

To allocate yachting and marinas to sea basins we need to use a proxy. We propose to either follow the approach for cruise or for coastal tourism. Probably the approach for coastal tourism provides a better estimate than cruise, as marinas are usually not linked to big ports for cruise ships, but to coastal touristic regions. In an ideal case, data on for instance marina capacity or leisure boats registered per port is used. Country experts will need to verify if such data is available.

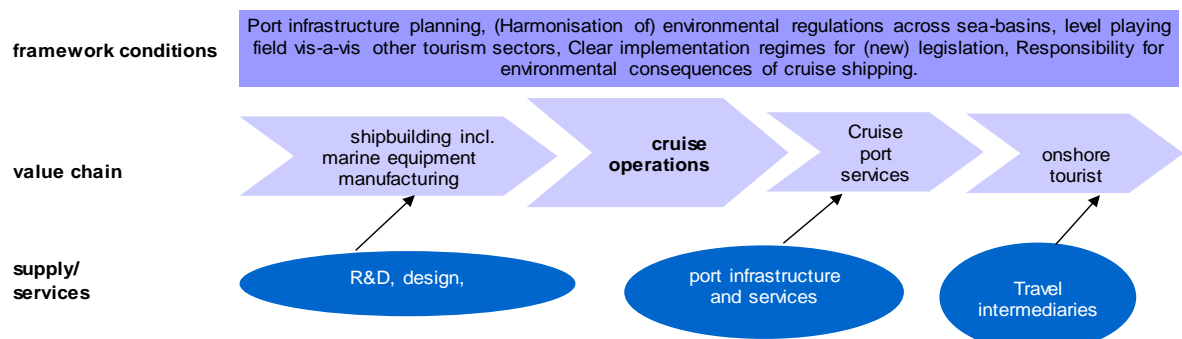
5.3 Cruise tourism

➔ Definition of the Maritime Economic Activity

The MEA of Cruise including port cities is defined as all activities associated to cruise holidays, including the ships used and the facilitations at destination ports. Cruise tourism is a form of tourism where people travel (cruise) on a ship. This can be to a sunny destination such as the Mediterranean or the Caribbean, but also to Norway, Alaska or Antarctica. It is a relatively luxurious form of travel. Worldwide, as well as in Europe, in the last decade the cruise market has seen a rapid growth. The European shipbuilding industry is dominant in the construction of these types of ships.³⁵

➔ Description of the value chain

The following figure shows the value chain as described in the BG study



Source: Ecorys (2012) BG report

The value chain described in the figure above focuses on the core activities. A broader definition would also include all kind of services offered on cruise ships or manufacturing of e.g. furniture for rooms on cruise ships. Nevertheless, also the figure above does not describe a measurable picture. We therefore define the core activities of the cruise tourism value chain as follows:

- Provisioning of travel
- Shipbuilding and marine equipment
- Operation of ships
- Port services and logistics – operating cruise terminals, port management
- Other maritime services (bunkering, ship repair, pilotage, etc.)
- Maritime works – constructing ports, maintaining access channels³⁶

5.3.1.1 Linking the value chain components to NACE sectors

In the following table links where possible NACE codes to the core VGAs described above.

³⁵Subfunction report Cruise

³⁶Subfunction report Cruise

| VGA | NACE code | Type | |
|--|---|------|---|
| Provisioning of travel | 79.11 Travel agency activities | S | Proposed to ignore. Code needs to be split between maritime and non-maritime. Code needs to be split between coastal tourism, yachting and marinas and cruise tourism. Propose to split only between coastal tourism and cruise tourism as an estimation to yachting and marinas is not possible. |
| | 79.12 Tour operator activities | S | Proposed to ignore. Code needs to be split between maritime and non-maritime. Code needs to be split between coastal tourism, yachting and marinas and cruise tourism. Propose to split only between coastal tourism and cruise tourism as an estimation to yachting and marinas is not possible. |
| Shipbuilding and marine equipment | 30.11 Building of ships and floating structures | P | Code present in MEA for various functions. Needs to be divided among all MEAs including shipping. Will be ignored here, as it has been included in 'other sectors' |
| Operation of ships | 50.10 Sea and coastal passenger water transport | P | The share not allocated to 1.3 Passenger ferry services will be allocated to Cruise tourism (see MEA 1.3 for methodology) |
| Port services and logistics | 52.22 Service activities incidental to water transportation | P | Share assigned as explained in maritime transport (sector allocated to 1.1, 1.2, 1.3, 1.4 and 4.3). (see MEA 1.3). |
| | 77.34 Renting and leasing of water transport equipment | | |
| | 52.24 Cargo handling | | |
| | 52.10 Warehousing and storage | | |
| Other maritime services (bunkering, ship repair, pilotage, etc.) | 33.11 Repair and maintenance of ships and boats | P | Proposed to ignore as included in 'other sectors' |
| Maritime works – constructing ports, maintaining access channels | ? | | Port services components are included in Maritime transport. Construction of water projects is addressed in 'other sectors'. |

5.3.1.2 Key to allocate NACE data to maritime vs non-maritime

Not relevant for the selected sectors.

It is proposed to report cruise GVA and Number of persons employed as a range between:

- Low end of the range will be constituted by code 50.10 and 52.22, only for the share related to cruise tourism.
- High end of the range will be constituted by data originating from European Cruise Council (ECC) figures, or – if available, estimates of the importance of the cruise MEA at national level (to be gathered by the country experts)

Specifically as regards the high end figure of the range, this will be taken from the following ECC reports:

- 2008: <http://www.ashcroftandassociates.com/images/ECC-Report%5B3-LR%5D.pdf>

- 2009: <http://www.ashcroftandassociates.com/images/Supp-EIR-2008.pdf> (pag. 13 Total employment by Country)
- 2010: http://ec.europa.eu/competition/consultations/2012_maritime_transport/euc_2_en.pdf

The ECC does not provide any figures for GVA, but only for **persons employed**. The table below reports needed figures (**direct employed in cruise**):

| Country | 2008 | 2009 | 2010 |
|-------------|--------|--------|--------|
| Italy | 10.500 | 12.300 | 12.469 |
| UK | 9.700 | 13.000 | 13.800 |
| Germany | 3.000 | 3.600 | 3.750 |
| Spain | 1.120 | 1.212 | 1.009 |
| France | 3.653 | 6.051 | 5.725 |
| Norway | 4.891 | 3.596 | 3.600 |
| Greece | 4.095 | 5.543 | 6.496 |
| Finland | 5.279 | 5.190 | 3.005 |
| Portugal | 3.024 | 3.137 | 3.084 |
| Netherlands | 2.039 | 1.521 | 2.360 |
| Malta | 833 | 1.266 | 1445 |
| Denmark | 1006 | 966 | 1.304 |
| Poland | 4.268 | 1.301 | 1.265 |
| Sweden | 997 | 1.018 | 1.102 |
| Cyprus | 678 | 526 | 571 |

In order to calculate the GVA from number of persons employed, it is proposed to calculate a ballpark figure derived from the ratio GVA/numb of persons employed of the low-end figure.

➤ Key to allocate NACE data to MEAs

50.10 Sea and coastal passenger water transport covers 1.3 passenger ferry transport and cruise tourism. The split can be made on the basis of number of passengers transported (ferry passengers cruise passengers). Please see also MEA 1.3.

➤ Key to allocate between sea basins

We propose to use the number of cruise passengers embarked and disembarked in NUTS2 regions to allocate cruise tourism to sea basins (see also MEA 1.3). This means that we calculate the ratio of passengers between sea basins and allocate the data on persons employed and GVA according to this ratio.

6. Coastal protection

6.1 Traceability and security of goods supply chains

6.2 Preventing salt water intrusion

6.3 Protection of habitats

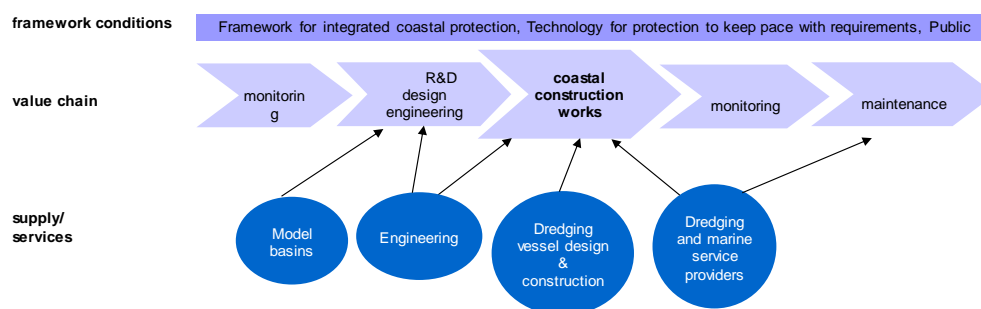
➤ Definition of the Maritime Economic Activity

Note: within the Blue Growth study, initially 3 MEA (or: sub-functions) were defined under the main function of Coastal protection: 5.1 Protection against flooding and erosion, 5.2 Preventing salt water intrusion, and 5.3 Protection of habitats. In the further elaboration process of the study however it was decided to combine the three and assess them as one MEA named 5.1 Coastal protection. For this reason, in the remainder of this memo as well as in the sea basin specific studies it is proposed to assess the Coastal protection function as one MEA.

Definition of the combined MEA: in the sub-function report, this is phrased as follows: "Coastal protection against flooding and erosion may be considered not as an economic sub-function like other maritime sub-functions, but rather as a condition sine qua non for the use of coastal areas and for allowing other functions to flourish. Risk of flooding and erosion threatens the performance of other maritime functions, and may even cause loss of life and of assets; coastal protection settles this threat."³⁷

➤ Description of the value chain

The value chain of this MEA was depicted (in the BG study) as follows.



While the value chain picture in fact describes the coastal protection processes, the main economic sectors relevant to this MEA are depicted under the supply/services

³⁷ Ecorys (2012), Blue Growth, Maritime Sub-Function Profile Report Coastal Protection (5.1.)

➤ Linking the value chain components to NACE sectors

The value chain as depicted above only allows the linking of part of the value chain components to NACE sectors. See below table.

| Value chain component | NACE Rev.2 sector(s) relevant | Comments/explanation |
|---------------------------------------|--|--|
| Model basins | 71.20 Technical testing and analysis | This relates to almost all MEA + large part is non-maritime |
| Engineering | 71.12 Engineering activities and related technical consultancy | This relates to almost all MEA + large part is non-maritime |
| Vessel design & construction | 30.11 Building of ships and floating structures | This relates to almost all MEA |
| Construction works | 42.91 Construction of water projects | This relates to almost all MEA + part is non-maritime |
| Dredging and marine service providers | | We assume that dredging and marine construction companies are covered under 42.91. |
| | 33.15 Repair and maintenance of ships and boats | This relates to all MEA |

Specific notes:

- At the time of the Blue Growth study, for particular reasons the shipbuilding sector was fully attributed to the maritime transport function, although in fact all other functions also make use of Ships and thus require part of this function. Moreover: the ships being built within Europe largely relate to other MEA than maritime transport.
- Other sectors providing inputs to the shipbuilding sector (supply of marine equipment, steel etc.) were not covered in the BG study. The same applies to e.g. services concerning implementation of machinery.<Question if we should now – if yes then across all MEA>.
- Other sectors supporting shipping activities are now either attributed to the transport function (e.g. 52.22 Service activities incidental to water transportation contains things like pilotage, berthing, lighthouse etc. also relevant to all other MEA using ships) or are ignored (e.g. the Tertiary sectors like financing & insurance

From the table above it is clear that none of the NACE sectors are very directly linked to this particular MEA. Moreover a number of sectors are largely non-maritime.

In the BG study, because of these reasons, instead of estimating the shares of the respective NACE codes relevant to this MEA, a bottom-up approach was followed, from two angles:

- Public expenses by MS for coastal protection works – this was taken from a study made in 2009.³⁸ Data in that study were gathered from national budgets where expenses for coastal works were specified.
- Turnover from major marine contractors. As coastal protection works are generally performed by marine construction companies, mainly dredger firms, and this sector is highly concentrated with 4 players dominating the market having some 80 %

³⁸European Commission (2009), The economics of climate change adaptation in EU coastal areas – Summary report.

market share (Van Oord, Boskalis, DEME, Jan de Nul), figures from their annual reports were gathered to compare with the public expenses.

These two steps have resulted in the reported estimated size of 1.0 – 5.4 bn EUR GVA.

As an elaboration of this MEA, we propose to:

1. Explore the feasibility of allocation keys (see below)
2. Alternatively continue the bottom-up analysis by repeating the BG approach for recent years and at country level.

Another approach would make it possible to have expenditure data at least for 5.1 “Protection from flood and erosion” and 5.3 “Protection of habitats”

Protection from flood and erosion: the study “The economics of climate change adaptation in EU coastal areas” (footnote 2) contains data on the average annual expenditure in costal protection over a certain time span, for a certain number of countries. In the case of Italy, for instance, one may take a time series of reference (2008, 2009, and 2010), and multiply the average annual expenditure (258.9 million) by three, so to have an estimated total expenditure of 776.7 million over the three years. Subsequently, we can take data from EUROSTAT COFOG (COFOG gov_a_exp) on environment protection (GF05) for Italy. We found out that over the same three years Italy spent 41030 million in environment protection (which of course include a broader range of activities).

The ratio (costal protection/environment protection * 100) between the two kinds of expenditure over our time series says that coastal protection amounts to 2% of the expenditure for total environment protection in Italy.

Therefore, we estimated that in 2008, 2009 and 2010 coastal expenditure was always 2% of environment protection.

A solution to estimate employment is yet to be found. However ballpark figures should not be difficult to find. The ballpark figure of EUR 100.000 of expenditure per employee, can be used if no other proxies are found

Key to allocate NACE data to maritime vs non-maritime

Since the majority of sectors relevant to this MEA also (largely) relate to non-maritime activities, a key is needed to estimate the maritime share.

| Value chain component | Key for maritime/non-maritime | Comments/explanation |
|--|--|---|
| 71.20 Technical testing and analysis | <ol style="list-style-type: none"> 1. Define value added generated by specialised marine testing centres using their annual reports 2. Calculate % of total GVA of this sector | In most countries there are only a handful of centres active in testing ships and equipment (e.g. in NL MARIN is virtually the only ship testing centre; KEMA, TNO and a few specialised universities do component testing) |
| 71.12 Engineering activities and related technical consultancy | <ol style="list-style-type: none"> 1. Gather data from at least 5 coastal protection projects conducted in the relevant MS (government data usually) 2. Acquire cost breakdown | It is assumed that the very majority (more than 95%) of this sector is non-maritime. Errors in estimating the maritime share are easily made here. Hence the proposed |

| Value chain component | Key for maritime/non-maritime | Comments/explanation |
|---|---|---|
| | <p>3. Calculate engineering share from total costs.</p> <p>4. If no recent projects can be found or no breakdown can be obtained in the respective MS, the average of other MS in the same sea basin will be applied.</p> | approach, which combines the maritime/non-maritime and the MEA allocation question. |
| 30.11 Building of ships and floating structures | Assumed 100% maritime | |
| 42.91 Construction of water projects | Assumed 100% maritime | |
| 33.15 Repair and maintenance of ships and boats | Assumed 100% maritime | |
| 52.22 Service activities incidental to water transportation | Assumed 100% maritime | |

➤ Key to allocate NACE data to MEAs

All sectors relevant to this MEA are also relevant to most other MEA. Hence an allocation between MEA is needed.

| Value chain component | Key for MEA share | Comments/explanation |
|--|---|--|
| 71.20 Technical testing and analysis | <p>Estimate % of testing activities related to ships intended for coastal protection works (e.g. dredging):</p> <ol style="list-style-type: none"> 1. Number of tests conducted by test centres (see previous) by type of ship 2. Calculate % of dredging and survey vessels 3. Multiply by % taken from below allocation of NACE 42.91 | <p>The assumption is that the value added and employment related to testing and analysis of ships is proportional to the number of tests – which is a simplification of reality. The assumption is also that testing of equipment is proportional to testing of ships.</p> <p>As it relates to ships relevant for other MEA as well, the key from 42.91 is used here as well.</p> |
| 71.12 Engineering activities and related technical consultancy | See under maritime/non-maritime above. | |
| 30.11 Building of ships and floating structures | <ol style="list-style-type: none"> 1. Gather shipbuilding production data from the MS, distinguishing ship types (if possible on the basis of output value, otherwise measured in CGT) 2. Calculate share of dredging and survey vessels (the types of ships relevant for coastal protection) 3. Multiply by % taken from below allocation of NACE 42.91 | <p>CESA (European Shipbuilding Association) publishes annual production figures by ship type and member state measured in CGT (a size and complexity measure), but not by value. Possibly national associations do and we can use values rather than CGT.</p> <p>As dredging/marine construction vessels are also relevant for other MEA (construction of ports, offshore energy, tourism facilities etc.), the share of coastal protection needs to be estimated.</p> |

| Value chain component | Key for MEA share | Comments/explanation |
|---|---|---|
| 42.91 Construction of water projects | Estimate % of work conducted by these ships related to coastal protection work: from annual accounts of individual marine contractors derive the % of turnover related to coastal protection works. | Assumption that the % of marine contractors overall (they usually work worldwide) is equal to the % relevant to the MS itself. If a MS specific figure could be gathered, that could be used. |
| 33.15 Repair and maintenance of ships and boats | Same % as under 30.11 | |

➔ Key to allocate between sea basins

The allocation between sea basins can be done via GIS for the MEA 5.3 Protection of the habitats. Specifically as regards 5.1 Protection against flooding and erosions, coastline length could be used as a proxy. However, this has to be validated case by case by country experts, as some coastline part can be more “sensitive” than others.

For those countries bordering multiple sea basins (DE, FR, UK, ES), an allocation to sea basins is needed. The allocation key however can be different for the various sectors, as follows.

| Value chain component | Key for MEA share | Comments/explanation |
|--|--|---|
| 71.20 Technical testing and analysis | Same as 30.11 | |
| 71.12 Engineering activities and related technical consultancy | Same as 42.91 | |
| 30.11 Building of ships and floating structures | % employment in shipbuilding in NUTS-2 regions along the respective coasts | In most countries, shipbuilding activities are concentrated in a limited number of regions |
| 42.91 Construction of water projects | % of coastline length in the respective sea basin | Assuming the levels of erosion/coastal protection needs are similar across the various coast lines. |
| 33.15 Repair and maintenance of ships and boats | Same as 30.11 | |

7. Maritime monitoring and surveillance

7.1 Traceability and security of goods supply chains

7.2 Prevent and protect against illegal movement of people and goods

7.3 Environmental monitoring

➔ Identification of the sectors of the MEA's value chain

Rather than being specific and well-defined economic activities, these three MEAs are “prerequisites” that can facilitate the growth of the blue economy. For these reasons, GVA and employment data are generally not available.

No NACE codes can be directly attributed to these MEA.

The value chain approach cannot be of much help, as every attempt to build a value chain of the sector may be seen as “arbitrary”.

➔ Data availability

A possible solution to gather some data could be to investigate at country level if any information exists via reports and data collection of Ministries (typically Environment and/or Defense), coastguards, police forces, environmental agencies, customs, etc.

We propose, however, to treat the sector as a whole, since it may be very difficult to find data for each MEA that make up Maritime monitoring and surveillance. Should country expert come up with data broken down by the three MEAs, it may be worth reconsidering the approach.

Another option could be to investigate whether national accounts have specific budget items dedicated to “Maritime monitoring and surveillance”. This worked for Italy, where a budget item attributable to the sector has been found.

As an alternative, data should be collected through interviews with selected policy makers and stakeholders. Once again, typically, it can be expected to collect some information by interviewing Ministries, coastguards, police forces, environmental agencies, etc.

Data on value added are very unlikely to be found or retrieved through interviews, however it is worth looking and asking for data on **public expenditure** and **employment** in these sectors.

➤ Methodology for managing data

A precise methodology to manage these data cannot be defined in advance, and will vary case by case according to the data found.

In principle, it can be argued that public expenditure (which is the most likely type of data to be found) can be used as a proxy for GVA.

It is possible, however, that public expenditure for one of the above MEAs may refer to a wider set of activities, not all necessarily related to the sea (e.g. public expenditure for traceability will most certainly also include land activities). In order to calculate the share of expenditure that can be attributed to marine and maritime activities, we can apply the ratio between the aggregated GVA of maritime NUTS 3 over national GVA. The corresponding percentage can be applied as a proxy to public expenditure in order to determine how much of the expenditure address marine and maritime activities.

As regards employment, on the other hand, there are two probable scenarios:

- If a figure is found, as in the case of GVA it will quite likely also include employees in land activities. Similarly to GVA, in order to calculate the share of employees in maritime activities, we can use the ratio between the number of persons employed in maritime NUTS 3 over the number of persons employed at national level. The corresponding percentage can be applied as a proxy to estimate how many persons employed are actually involved in maritime activities.
- if a figure is not found, the ballpark figure of a GVA of EUR 100.000 per employee can be applied. In this case, by dividing GVA (or its proxy i.e. public expenditure) by 100.000 we will obtain a proxy of the number of persons employed in the sub-function.

➤ Key to allocate between sea basins

Coastline length can be used to allocate this MEAs when a country borders on two different sea basins:

E.g. France³⁹:

1. North Sea: 60 km (1,44% of total expenditure and employment)
2. English Channel: 1060 km (25,42% of total expenditure and employment)
3. Atlantic Ocean: 615 km (14,75% of total expenditure and employment)
4. Mediterranean Sea + Corsica: 2435 km (58,39% of total expenditure and employment)
5. Total: 4170 km

This allocation needs to be validated by the Country experts.

For the purpose of this study, North Sea could be disregarded there's a very limited coastline. The English Channel is attributed entirely to the Atlantic Ocean.

Similar data on coastline length are available for the other countries at national level. Country experts will in any case have to validate this proxy case by case, as it may well be that some parts of the coast are not inhabited, for instance, and therefore require lesser monitoring efforts.

³⁹ http://gcantal.free.fr/IMG/pdf/Les_cotes_francaises_-_correction.pdf