Green Jobs in the Blue Economy – A Bottom-up Approach

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Final Report to DG Environment of the European Commission

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Executive Summary

E.1.0 Introduction

E.1.1.1 Context

According to the Commission's working definition, the Blue Economy includes any market activity contributing to the EU's Gross Domestic Product that depends intrinsically on the sea.[1] Whilst much of this activity is concentrated around Europe's coasts, the Blue Economy also includes those operating inland. For example, manufacturers of marine equipment.

Together, these activities represent a significant part of the European economy. The Commission is dedicated to developing and enhancing the opportunities for economic growth and job creation within it, as demonstrated by recent communications on Blue Growth and Blue Innovation. [2,3]

At the same time, the Commission has a long-standing commitment to promote a 'green growth' approach and a sustainable environmental framework. It is therefore desirable that the expansion of the Blue Economy is sustainable, particularly as many of the activities within the Blue Economy are dependent on the quality of the marine environment.

E.1.1.2 Project Objectives and Scope

The knowledge and experience of how best to green the Blue Economy may be held by local operators with an intricate knowledge of their industries, communities and environment. At present, this might not always be accessible to policy-makers at the EU level.

The objective of this project was therefore to explore the knowledge and experience held by relevant economic actors that can help promote green growth in the blue economy – thereby helping to generate green jobs. To this end, the project has two purposes:

1) To enhance existing knowledge about potential action through the identification and spreading of good practice, and
2) To inform EU level policy in cases where EU level action can support local efforts.

[1] DG MARE (2016) Note for TG1 - Subject: Size, Nature and Dynamics of the Blue Economy, January 2016
[2] Communication from the Commission - Blue Growth: opportunities for marine and maritime sustainable growth (COM(2012) 494 final)
[3] Communication from the Commission - Innovation in the Blue Economy: realising the potential of our seas and oceans for jobs and growth (COM(2014) 254 final/2)

In line with these objectives, there was an emphasis on identifying novel activities, operating at a local scale, as opposed to those that are more established and fully commercially developed. An example of this might relate to innovative efforts to improve the sustainability of aquaculture, or to reduce the environmental impact of coastal tourism. These activities were the focus of this study because they are less 'visible'. In this way, less is known about what is being undertaken, to what extent they are successful and whether there are any barriers that stand in their way.

Efforts were also made to identify not just those activities that were currently operational, but also those than had been unsuccessful and those in the planning stages.

E.1.1.3 Defining 'Green Jobs'

As part of the research there was a clear need to ensure that the term 'green job' was well defined. Although previous definitions have been provided by organisations such as UNEP and the OECD, neither of these adequately reflect the marine context in which this study is framed.

This research identified three different types of green job that could be defined as follows:

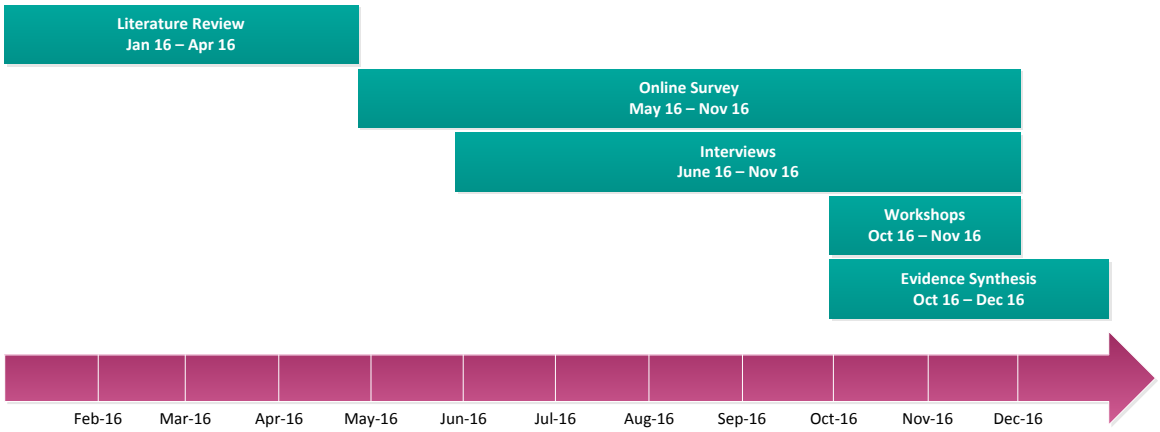
1) Production of goods, services and research that seeks to reduce environmental damage to primarily marine environments;
2) Production of goods, services and research that seeks to reduce environmental damage to primarily terrestrial environments;
3) Production of goods, services and research that seeks to exploit the marine environment for economic growth, whilst limiting environmental risk and damage; and
4) Regulatory activities to minimize or correct environmental damage and risks to the marine environment.

The scope of the project was limited to identify direct jobs. Indirect and induced jobs were excluded from the research.

E.2.0 Methodology

The study utilised both primary and secondary research methods to identify green activities. An overview of the methods used is provided in Figure E2: 1, with each task outlined individually below.

E2: 1: Overview of Methodology



E.2.1 Literature Review

The objective of this task was to develop an Excel-based database to collect examples of actions related to initiatives that are 'greening' the blue economy from all four EU Sea Basins. These were as follows:

- Baltic Sea;
- Black Sea;
- Mediterranean Sea; and
- North East Atlantic Ocean and North Sea.

A range of information sources were used to capture information. This included: evaluations, reports and article published by government and government bodies, academic articles, telephone interviews with relevant economic actors and grey literature, such as reports by consultants.

The database captured key information on each activity. This included, but was not limited to: a description of the activity, sector, economic actor(s), any economic information available and the type of environmental pressure addressed.

A total of 228 activities were captured across the four sea basins. 83 activities were captured in other countries. The results of the literature review are available in a separate document.[4]

E.2.2Internet Survey

The survey aimed to identify examples that might not have been captured in the literature review. It would also provide a more up-to-date picture of the nature of more

[4] Available online at the European Commission's Marine Competence Centre: http://mcc.jrc.ec.europa.eu/dev.py?N=simple&O=405&titre_chap=IMP%20-%20Green%20jobs%20in%20the%20Blue%20Economy&titre_page=IMP%20-%20Green%20jobs%20in%20the%20Blue%20Economy

environmentally friendly activities being undertaken, and provide a database of contacts that could be invited to the proceeding regional workshops.

The questionnaire included a set of 35 closed-ended / open-ended questions, focused on many of the key themes used to capture data in the literature review, alongside additional research questions that had developed from as a result of the first data collection task.

Respondents were solicited by a different methods. A list of relevant contacts was developed with the Commission and subcontractors. These organisations were contacted directly – by email and telephone – with information about the survey. Further to this, links to the survey where dissemination via a number of indirect methods including: online noticeboards, workshops and events, newsletters and social media.

The survey received 83 results in total. However, only 38 of these were complete.

E.2.3 Interviews

A number of semi-structured telephone interviews were conducted with individuals from the most novel and innovative activities identified in the literature review and survey. Qualitative research of this nature provided the opportunity for a more in-depth study of the motivations and, enablers, barriers and other more strategic elements of activities that were difficult to capture in the earlier tasks.

20 interviews were completed across the four sea basins.

E.2.4 Workshops

The final task involved the delivery of regional workshops in the different EU sea basins. The aims of the workshops were to gather more-depth knowledge of activities, identify additional examples and to test the findings from earlier tasks.

Workshops were held in two sea basins. The Baltic Sea event was held in Tallinn, Estonia, and the North East Atlantic Event was held in Brussels, Belgium. Events were originally planned for all four sea basins. Low levels of interest for workshops scheduled in the Mediterranean and Black Sea regions, however, meant that these did not go ahead.

E.2.5 Evidence Synthesis

The evidence collected through each of the four tasks was used to inform the discussion and analysis (Section E.3.0). This method of 'triangulation' was used to corroborate findings and increase the understanding of particular issues.

E.2.6 Limitations

In identifying the examples, the research encountered a number of limitations. The extent to which they have influenced the findings is unclear. It is important, however, that they are acknowledged in the context of interpreting the findings. These are outlined below:

1) The definition of a ‘green’ activity or ‘green job’ is not sufficiently defined. This posed problems for the elements of the research using primary research, whereby some organisations were unsure whether their activities would be considered ‘green’ or sufficiently ‘green’. For a small number of organisations, this led to a reluctance to discuss their activity.
2) The research was primarily focused on innovative and niche activities. These tended to identify examples which were not yet commercialised and therefore had limited numbers of jobs.
3) Associated with this issue, the most visible examples were beneficiaries of research and development funding from public institutions. The effect of this might have been to distort the research findings in the favour of these projects.
4) This might also have been the case for successful projects. Those responsible for activities that have not achieved their objectives are less likely to promote or publicise them.
5) Difficulties were encountered when trying to engage with economic actors. One possible reason for this is that the idea of greening the Blue Economy is a relatively new and novel area. Additionally, some stakeholders, particularly in the private sector, may have been concerned that openly discussing their activities would encourage competition.

E.3.0 Green Activities within the EU28

The findings from the individual research tasks were summarised according to the following themes:

E.3.1.1 Types of Activity Identified

The coverage of the activities identified in the research included a wide range of economic sectors, including the majority of those identified as priority areas for the growth of the Blue Economy. The notable exception to this was the mineral resources sector, where no activities were identified.

A large number of examples are being undertaken in the more well-established sectors, such as shipping, ports and fisheries. In these cases, ‘greening’ activity is usually focused upon reducing the impact of an existing practice. For example, the use of alternative fuels or methods of propulsion for vessels, or improved management of waste products such as ballast water and oil.

There was some variance in the nature of activity according to geographic location. In the Mediterranean, for example a large part of the economy is geared towards coastal tourism, and the nature of activities identified reflected this. By comparison, a wider range of activities were found in Northern and Western Member States, in the Baltic and North-East Atlantic Sea basins, and very few activities were identified in the Black Sea basin.

Although the majority of economic actors fall within the private sector, a large proportion were being undertaken by the public sector, research institutions and NGOs. Further examination of the results from the literature review showed that 80% of the activities received financial support from public funds. This is a significant proportion. The key message seems to be that public finance is playing a large role in greening the Blue Economy, either through the creation of jobs in the public sector or through support in the form of funding and grants.

Data on the number of jobs involved in the activities was particularly hard to identify as very little published information appears to exist on this issue. Additionally, the primary research was also relatively ineffective as many participants had limited knowledge of the precise number of jobs involved in their activities. The results of the literature review and survey revealed that the number of jobs associated with green activities were typically small – with less than 10 direct FTEs associated per activity. This is not to say that activities involving a large number of green jobs may not exist. Organisations with an engineering or technical focus, such as marine renewables, often had a large number of high value green jobs associated them. This includes direct jobs related to design and development, but also those related to manufacturing and other parts of the supply chain that are more difficult to quantify. However, as identified in Section 1.2, offshore renewable activities were not a focus area for this study.

When compared to overall size of the Blue Economy the number of examples identified in the literature review did not align with the economic output of each of the marine sectors. For example, only a small number of examples were identified in some of the largest economic sectors, including coastal tourism and non-living resources. The rationale for this difference was not observed in the literature but can perhaps be explained by some of the following factors:

- The scale of environmental impact associated with activities within the sector might not be aligned with the economic output of the sector;
- Incentives to reduce or prevent environmental impacts associated with the sector might not be aligned with the economic output of the sector; or
- Efforts to tackle environmental impacts in some sectors may be more advanced than others.

E.3.1.2 Environmental Impacts Addressed and Motivations

There are a range of motivations that drive green activities. Influenced by the nature of activity, these can be broadly defined as being economic, environmental or regulatory, although the three are often intertwined.

A large number of activities were research-based, and associated with the public sector, universities or research institutions. There was anecdotal evidence to suggest that the commercialisation of new technologies or methods was not always high on the agenda for these projects. Furthermore, there are concerns over the longevity of the jobs created, insofar that they are reliant on financial support.

There was also evidence to suggest that many of the activities undertaken by larger private organisations were associated with a Corporate Social Responsibility (CSR) strategy. This may go some way to explaining the attention that 'higher profile' environmental issues – such as emissions of greenhouse gases, or habitat conservation – received.

E.3.1.3 Barriers to Activities

Participants in the research highlighted a number of issues and barriers that they felt had impacted the development of more environmentally friendly activities. The nature of these barriers were sector-specific; few were identified that affected multiple industries simultaneously. Access to finance was an exception to this rule, with a number of participants citing this as an issue. However, as with other issues, it appears that they were more of a nuisance rather than a barrier to activity altogether. In order to truly test this hypothesis, further research would need to target a greater number of unsuccessful activities; a recognised limitation of this research (see section E.2.6).

E.4.0 Recommendations

This research has identified a wide range of innovative activities being undertaken across Europe. There are a number of recommendations that have emerged from this work, which can be categorised according to the following themes.

Definitions and Terminology

For many organisations and individuals involved in the research, the term 'green' jobs was an abstract concept. There was uncertainty as to whether their particular activities would be classified as being environmentally friendly, which might have impacted on their willingness to participate in some aspects of the research.

Looking ahead, it might be beneficial for future research to develop a more accessible definition of 'green' activities. This could be informed by the activities identified as part of this study. Alongside a general definition, it is also recommended that illustrative examples, relevant to individual economic sectors, are provided, along with a forward looking vision statement. Together, this supporting information would give potential participants a clear grasp of the concept.

Engagement with Economic Actors

This research utilised a multi-methods approach. As identified in previous sections, this had mixed success. It was clear that approaches using online methods (including survey and email invites) had limited appeal to many potential participants. One reason for this may have been that many of those identified as part of the research were SME's, with little capacity to engage in research activities.

Accordingly, if future research was to be conducted with a similar group of participants, it is recommended that alternative approaches be used. This might include a greater use of telephone research or, where possible, face-to-face research. Given that many

operators in the marine environment are dispersed geographically, telephone research is more likely to be cost-effective. It may also be necessary to incentivise participation. One way of doing this is by offering entry into a prize draw.

Addressing Barriers

The research identified a number of barriers to more environmentally friendly activities. The nature of these barriers are wide-ranging and multi-faceted. Given that many of the participants were actively working on successful activities it is not clear what the overall impact of each of these has been on individual sectors as a whole and whether some are considered to be more impactful than others. Therefore it is recommended that these barriers are investigated further so to ensure that they can be better understood. In the following sub-sections a set of specific recommendations are provided.

Market and Economic Barriers

It is recommended that market and economic barriers are addressed according to the structure of the EU maritime sectors. That is, they are examined and that appropriate solutions are considered at a sector-specific level. At the same time, it is important to consider the interconnectedness of the Blue Economy, and the extent to which the difference sectors coexist.

This is in consideration of the individual characteristics of each sector. For example, in some sectors activities are led by a small number of larger organisations. The approach to engaging these organisations in more environmental friendly activities is likely to be different to sectors which are comprised of a greater number of smaller businesses.

Availability of Finance

The availability of start-up finance for environmentally friendly activities was identified as an issue by participations from a range of economic sectors. Whilst existing mechanisms, such as Horizon 2020 funding, were being accessed by a number of organisations it appears necessary to consider the use of alternative mechanisms to support these novel activities. Notwithstanding adherence with state-aid guidelines, it is suggested that public sector solutions providing micro-finance might be a suitable form of support.

Information Failures

Access to data and information on the marine environment is essential for both understanding the environmental impacts associated with human activity and enabling some types of environmentally friendly activities. In recognition of this, a number of efforts are already underway (as outlined in Section 4.3.3); such efforts should continue to be supported.

Technical Barriers

For a limited number of activities, the technical feasibility of the activity was seen as a barrier and/or issue to growth. Often economic operators were seeking to address these through research and development activities funded either by public or private finance. Where the objective of research finance is to directly promote economic growth it is

recommended that finance is focussed on organisations that are sufficiently motivated to commercialise the research. Additionally where the intention is to generate intellectual property for the wider scientific and research community, then it is recommended that adequate knowledge dissemination activities should be conducted.

Rules and Regulations

Many of the failures concerning rules and regulations were specific to individual participant's circumstances. It is therefore difficult to identify a recommendation that is able to address these issues together. Therefore it is suggested that these are considered on a case-by-case basis once robust information becomes available to the Commission.

Demand-side Barriers

There appears to be a shortage of demand for some activities providing more environmentally-friendly goods and services. There are a wide range of influences on consumer demand and it is difficult for a single recommendation to be provided that would address this issue. Accordingly, it is recommended that further research be undertaken to better understand the barriers to demand.

Contents

1.0 Introduction

Eunomia Research & Consulting ('Eunomia') in collaboration with AKTiiVS (based in Latvia), the National Research and Development Institute for Marine Geology, or GeoEcoMar (based in Romania) and the Institute for Water of the Republic of Slovenia, or IWRS (based in Slovenia) are pleased to present this report to DG Environment of the European Commission (the 'Commission') under Framework ENV.D.2/FRA/2012/0025 on Green Jobs in the Blue Economy – a bottom-up approach.

1.1 Context

According to a working definition, the Blue Economy includes any market activity contributing to the EU's Gross Domestic Product that depends intrinsically on the sea. [5] Whilst much of this activity is concentrated around Europe's coasts, the Blue Economy also includes those operating inland. For example, manufacturers of equipment used in the marine environment.

The Commission is dedicated to developing and enhancing the opportunities for economic growth and job creation within the Blue Economy. This is in line with the 2012 Communication on 'Blue Growth' and the subsequent Communication on 'Blue Innovation' in 2014.[6,7] These strategies are focused on harnessing the, so far, untapped potential of Europe's oceans, seas and coasts for jobs and growth. Such opportunities are considered to be significant, provided the appropriate investments and research are made.

At the same time, the Commission has a long-standing commitment to promote a 'green growth' approach and to promote a sustainable environmental framework, with environmental innovations which marine based industries can successfully implement and export. The 7th Environment Action Programme recognises the importance of protecting and enhancing the EU's natural capital whilst developing a green and competitive low-carbon economy. [8] Specifically regarding the marine environment, the Marine Strategy Framework Directive (MSFD) aims to achieve 'Good Environmental

[5] DG MARE (2016) Note for TG1 - Subject: Size, Nature and Dynamics of the Blue Economy, January 2016
[6] Communication from the Commission - Blue Growth: opportunities for marine and maritime sustainable growth (COM(2012) 494 final)
[7] Communication from the Commission - Innovation in the Blue Economy: realising the potential of our seas and oceans for jobs and growth (COM(2014) 254 final/2)
[8] Commission Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' Text with EEA relevance (OJ L 354, 28.12.2013)

Status' within marine waters by 2020 and protect the resource base upon which marine-related economic and social activities depend.[9]

It is therefore desirable that the expansion of the Blue Economy is sustainable, particularly as many of the activities within the Blue Economy are dependent on the quality of the marine environment.

1.1.1 Priority Sectors of the Blue Economy

The individual sectors of the Blue Economy are interdependent, both within the marine economy, as well as with the terrestrial economy. They rely on common skills and shared infrastructure such as ports and electricity distribution networks, whilst also depending on others using the sea sustainably.

Whilst diverse, the Blue Growth Communication identifies five key sectors with a high potential for growth, these include: [10]

1) Blue (marine) energy;
2) Aquaculture;
3) Maritime, coastal and cruise tourism;
4) Marine mineral resources; and
5) Blue biotechnology.

This study focuses upon these key sectors. At the same time, it also considers the other sectors active in the Blue Economy. These include the following:

- Carbon Capture and Storage (CCS);
- Coastal Protection;
- Desalination;
- Dredging;
- Fisheries;
- Marine Recreation;
- Military Defence;
- Oil & Gas;
- Ports;
- Public Sector;
- Shipping; and
- Telecoms and Communications.

[9] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (OJ L 164, 25.6.2008)

[10] Communication from the Commission - Blue Growth: opportunities for marine and maritime sustainable growth (COM(2012) 494 final)

1.1.2 Developing the Blue Economy

This study was based on the approach that there are two ways by which individual operators can make the Blue Economy more environmentally-friendly:

1) They may continue to engage in existing sectors and activities, but in new ways that reduce environmental impacts while at the same time boosting innovation, profitability and employment; and
2) They may develop new types of products and services with the aim of reducing environmental impacts.

There are a number of actions that could be taken to further the greening of the Blue Economy. For example, targeted policy-making, dedicated funding research and innovation, unlocking data and information and promoting the exchange of good practice. Creating the right conditions will contribute to the ability of the private sector to play a leading role in helping the Blue Economy reach its sustainable growth potential.

The knowledge and experience of how best to green the Blue Economy may be held by local operators with an intricate knowledge of their industries, communities and environment. At present, this knowledge might not always be accessible to policy-makers at the EU level. Making this available could help identify ways in which the Commission can act to further support sustainable activities.

1.2 Project Objectives

The objective of this project is to explore the knowledge and experience held by relevant economic actors that can help promote green growth in the blue economy and generate green jobs.

The scope of the project includes operators that are engaged in, or thinking about making the Blue Economy more environmentally-friendly in a profitable manner. It also includes activities that have tried and failed.

To this end, the project has two objectives:

1) To enhance existing knowledge about potential action through the identification and spreading of good practice, and
2) To inform EU level policy in cases where EU level action can support local efforts.

In line with these objectives, there was an emphasis on identifying novel activities, operating at a local scale, as opposed to those that are more established and fully commercially developed. An example of this might relate to innovative efforts to improve the sustainability of aquaculture, or to reduce the environmental impact of coastal tourism. These activities were the focus of this study because they are less 'visible'. In this way, less is known about what is being undertaken, to what extent they are successful and whether there are any barriers that stand in their way.

1.2.1 Key Research Questions

Two categories of research question were designed to achieve the objectives outlined above. These can be described as those which relate to **describing the types of activity** and those which relate to **explaining the types of activity identified.** Each of these are elaborated as follows:

1) **Descriptive and Characterisation Research Questions**

These questions aimed to provide an understanding of the types of activity being undertaken:

- Which 'economic initiatives' are considered relevant for greening of the blue economy;
- Which regional, national and EU initiatives are ongoing or have phased out;
- What are the policy instruments (economic, environmental and social) at regional, national and EU level supporting and enabling these initiatives;
- Which economic actors;
- What sectors(s);[11]
- Where are the borders of the blue economy (economic sectors);
- What period of analysis (How far back do we go?);
- Which geographical coverage: Mediterranean Sea, Baltic Sea, Black Sea, North East Sea and beyond the EU;
- Criteria on the quality of data to be added in the database. In other words, which information regarding an identified action/good-practice need to be gathered and recorded. This can also be used to build the database structure.

2) **Explanatory Questions**

Besides the descriptive questions, that formed the backbone of the research, a series of questions that related to explaining further details on selective initiatives, these included:

- What is the potential for wider dissemination of the activities?
- Is there a potential for public authorities to support this kind of activity or to remove obstacles, and if so at what administrative level?
- Provide more detailed information about initiatives undertaken exclusively by the private sector:
    - What is the most up-to-date economic contribution of the activities?
    - What business models are deployed by private sector businesses?
    - How does the 'green' economy interact with the conventional economy?
    - What types of activities have been undertaken without public sector support?

[11] As per those outlined in Section 1.1.1.

    - Why is there geographic variance in private sector initiatives?
- Assess failed initiatives and those which have yet to be implemented:
    - For the initiatives identified that have failed, we seek to gain a better understanding of the challenges involved and the barriers identified;
    - For the planned initiatives yet to be delivered, is there a detailed plan outlining the implementation of those initiatives?
    - Who are the catalysts (main actors) to drive these initiatives forward and who have acted as a barrier towards its success?

1.3 Defining 'Green Jobs'

Within this research, there was a clear need to ensure that the term 'green job' was understood by both the research team and participants within the research. There is no single agreed definition of a 'green' job and it is clear that different individuals and organisations adopt a spectrum of understanding of the term.

UNEP has adopted a definition that attempts to incorporate aspects of job content as well as the characteristics of industry goods and services. It has defined green jobs as: [12]

> *"work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high-efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution."*

The UNEP definition also includes reference to specific characteristics of green jobs. These include jobs which offer adequate wages, safe working conditions, job security, reasonable career prospects, and worker rights.

An alternative definition is provided by the OECD, which states that green jobs as:[13]

> *"activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes technologies, products and services that reduce environmental risk and minimize pollution and resources."*

Neither of these definitions adequately reflect the marine context by which this study is set in. Therefore for the purpose of this research we have adapted the OECD definition, and placed it within a marine context. The definition used was namely activities which:

1) Produce goods, services and research that seeks to reduce environmental damage to primarily marine environments; or

[12] See: http://www.unep.org/PDF/UNEPGreenjobs_report08.pdf
[13] OECD (2009) OECD Green Growth Studies Green Growth in Cities

2) Produce goods, services and research that seeks to reduce environmental damage to primarily terrestrial environments; or
3) Produce goods, services and research that seeks to exploit the marine environment for economic growth, whilst limiting environmental risk and damage; or
4) Regulatory activities to minimize or correct environmental damage and risks to the marine environment.

Alongside this definition the scope of the project was limited to identify direct jobs with indirect and induced jobs excluded from the research.

It should be noted that the specific characteristics of jobs were not considered as part of this study. Whilst the UNEP definition referred to characteristics such as adequate wages, safe working conditions, job security, reasonable career prospects, and worker rights, these aspects were not within scope of this research.

1.4 Structure of this Report

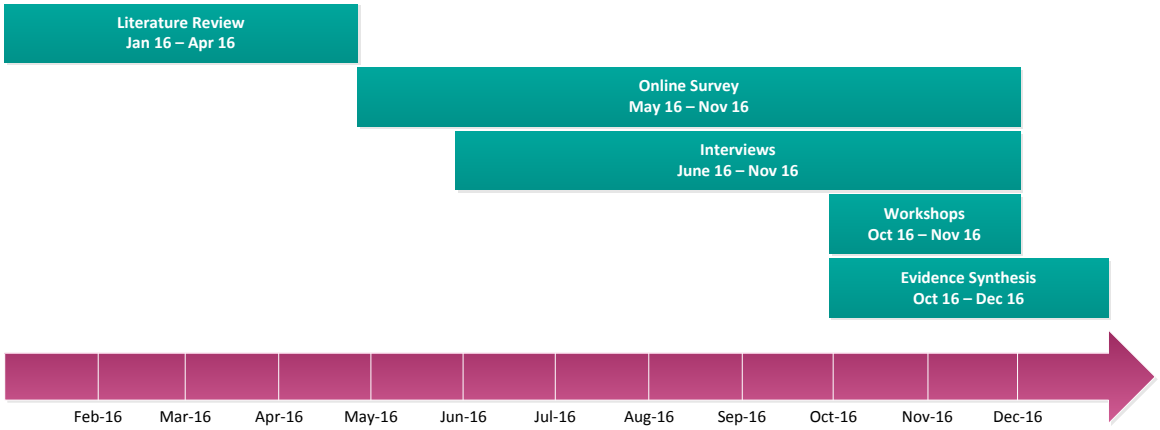
This report is structured as follows:

- **Section 2.0: Methodology.** This section provides an overview of all activities carried out by the team to collect examples in the blue economy, including the: literature review, survey, interviews and regional workshops.
- **Section 3.0: Blue Economy.** This section provides an overview of the Blue economy within the EU from an economic perspective.
- **Section 4.0: Green Activities within the EU28.** This section describes the key findings of green activities identified within the EU28, including types of activities identified, environmental impacts addressed and motivations and lastly on the barriers identified to initiatives.
- **Section 5.0: Summary of Key Findings.** This section presents a summary of key findings from the research; and
- **Section 6.0: Recommendations.** This section presents a number of the recommendations and lessons learnt from this research.

2.0 Methodology

The focus of this study was to utilise both primary and secondary research to identify green activities as identified in Section 1.2. An overview of the methodology is shown in Figure 2-1 and described in the following sub-sections.

Figure 2-1: Overview of Methodology



2.1 Literature Review

The objective of this Task was to develop an Excel-based database to collect examples of actions related to initiatives that are 'greening' the blue economy from all four EU Sea Basins, covering:

- Baltic Sea (delivered by: Economic Research and Consultancy for Water and Biodiversity Protection Policies – AKTiiVS)
- Black Sea (delivered by: National Institute of Research and Development for Marine Geology and Geo- ecology – GeoEcoMar)
- Mediterranean Sea (Delivered by: Institute for Water of the Republic of Slovenia – IZVRS)
- North East Atlantic Ocean and North Sea (Delivered by: Eunomia)

The foundation of the literature review was based on the key research questions identified and listed in Section 1.2.1.

Development of Coding Strategy and Database

Coding of information sources was a key element of the project design. An example of our approach to coding was developed during the proposal stage and formed the basis of the design of an Excel-based database. Each code was fully referenced and the database made full use of tags and filtering to ensure easy extraction of data and that the database is fully searchable. With the Commission's approval we developed an Excel database that was used as a basis to identify the examples and record them. This is provided as a separate document.

The assessment sections that formed the basis of the database included:

a. Administrative Information
b. Description of the action
c. Identification of actors involved
d. Support from programme
e. Policy Action at EU level or beyond relevant in enabling or encouraging the action
f. Assessment of success and effectiveness including evaluation
g. Economic Information
h. Type of Environmental Pressure
i. Assessment of its suitability for replication

2.1.1 Literature Overview and Data Collection

A range of tools to gather data were utilised, these can be summarised as follows:

Internet

We used the internet to access the following types of information:

- Evaluations commissioned by the European Commission and other European and international institutions and Agencies;
- Reports and articles discussing Government and non-Government interventions in the Blue Economy on a national, regional and local level;
- More general papers on barriers and opportunities for investors in the blue economy; and
- Other relevant papers looking into the effect of policy interventions, funding and employment opportunities, which may be relevant to Blue growth.

Electronic Journals

In addition to using the internet, Eunomia has access to OpenAthens and GoogleScholar, which we used to search a range of electronic journals.[10] The scope of such journals includes the scientific, technical, social scientific, marine and maritime policy, business and economics literature.

When reviewing these sources, we used reference lists and bibliographies to track down further evidence and to reach primary sources of information where possible. As a working principle, our approach has been to 'go to the primary source' since some sources quote poor quality data in support of their argument.

Telephone Research

We contacted international and local actors engaged in different sectors of the maritime economy, in all regional seas of the EU, to request information about literature, reviews and analyses that helped to answer the research questions.

Grey Literature

We recognise that grey literature, such as reports from consultants and other groups, which is not always publicly available, may also hold relevant information. Eunomia and the subcontractors have a substantial network of contacts in the maritime and resource

management industries, and utilised these contacts in order to gain intelligence and literature not currently in the public domain.

Results

The results of the literature review are available in a separate document[14].

2.2 Internet Survey

The development and delivery of the survey under Task 2, as stipulated in the ToR, aimed to:

> *"to gather information about initiatives, undertaken by economic actors in the EU, that are relevant for the greening of the blue economy"*

Therefore, the aim of the survey was three-fold:

- To identify examples that previously haven't been written about, including: initiatives that currently exist, ones that have tried but were not successful, or ones that are currently in the planning stage;
- To provide a more up-to-date picture of some of the examples that were likely to already be captured in the literature review; and
- To identify key contacts that would be key to invite to the regional workshops.

Following the Interim meeting with the Commission, it was recognised that the approach to address part of Task 2 through an online survey would not require a large amount of additional resources and therefore was approved.

Survey Design

The survey was designed by developing a set of 35 closed-ended / open-ended questions. The survey design focused on identifying more up-to-date examples of initiatives involved in the green blue economy and gathering basic information about them. Therefore we included many of the key research questions included in the literature review, alongside the new research questions that emerged since the research commenced. We included initiatives that currently exist, ones that have tried but were not successful, or ones that are currently in the planning stage.

The topics included:

- contact details;
- actors involved;
- type of environmental pressure seeking to be addressed;
- description of the activity;

[14] Available online at the European Commission's Marine Competence Centre: http://mcc.jrc.ec.europa.eu/dev.py?N=simple&O=405&titre_chap=IMP%20-%20Green%20jobs%20in%20the%20Blue%20Economy&titre_page=IMP%20-%20Green%20jobs%20in%20the%20Blue%20Economy

- programme of support;
- whether a policy instrument was involved;
- economic information (e.g. turnover and employment); and
- potential for replication.

The survey included a 're-contact' question. This was used for inviting participants to the regional workshop and/or interviews at later stages in the research. It was also used if there were gaps in the information they provided.

The survey questions are included in Appendix A.2.0.

Target Groups

The primary target group identified for the survey covered economic actors undertaking 'green' activities. Organisations falling under one of the following categories were identified including those 'umbrella' organisations that disseminated the online survey:

- Advisory body
- Aquaculture company
- Environmental Protection Agency
- Fishing organisation
- Harbour Authority
- Maritime company
- Ministry (or local administration)
- National Agency for Fishery and Aquaculture
- NGO's
- Offshore company (energy and mineral resources)
- Port authority and municipality
- Recycling sector
- Research institute or university
- Relevant company acting on the coastal areas (potentially generate environmental pressures)
- Shipping company, shipping association
- Tourism organisation (hoteliers, agencies etc.)

In order to ensure that the participants vary across different economic sectors and across each of the sea basins, we disseminated the above list to our subcontractors who filled it in with their network contact details and together with our contacts we ended up with a comprehensive list of 156 organisations (including contact details). Specifically, the table template included the following sections:

- Organisation name
- Project partner responsible for contact
- Person responsible for contact
- Country organisation based in
- Scale of activity
- Country(ies) organisation active In
- Type of organisation

- Main activity type (relevant to project)
- Reason to contact
- Contact name/Email Address/Phone Number
- Source of contact
- Twitter handle (@)
- Contacted
- Completion
- Round two
- Dissemination

All EU countries were contacted, via direct and indirect recruitment and the main survey contacts database was updated on regular basis by our team.

A bespoke email address greenjobs@eunomia.co.uk was created to ensure any communication with the targeted contacts was effectively captured in outlook in a consolidated format.

Recruitment

Recruitment for participants was undertaken using the following techniques:

Direct Recruitment

Organisations and individuals were recruited via email and telephone. The email contained a link to the survey alongside an outline of the project objectives and a deadline for completing the survey. This deadline was extended to ensure higher participation of complete questionnaires. In many cases, a follow-up call was carried out to ensure the individual contacts viewed and completed the survey.

Indirect Recruitment

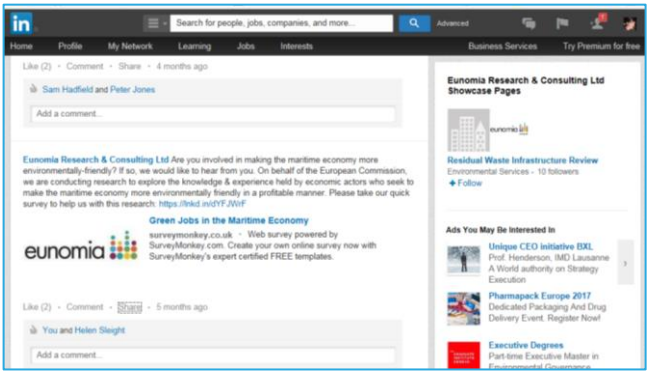
Alongside the direct recruitment we disseminated links to the survey via a number of communication channels. These included:

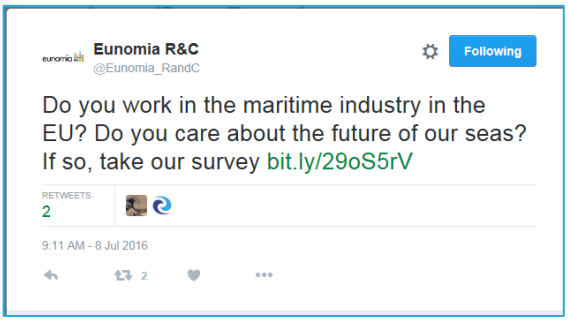
- **Online**. Some description of the project including a link to the survey was available online. Some examples can be seen below:
  - http://maritimaklustret.se/green-jobs-in-the-maritime-economy-survey/
  - http://mcc.jrc.ec.europa.eu/dev.py?N=simple&O=405&titre_chap=D11 Energy and Noise&titre_page=IMP - Green jobs in the Blue Economy
- **Workshops and Events**. Eunomia and subcontractors promoted the survey during relevant thematic events such as the:
  - European Maritime Day, in Turku, Finland on 18 – 19 May 2016;
  - Blue Economy Business and Science Forum – The Hamburg Summit: 12-13 September 2016;
  - "Measures to Prevent Marine Plastics – A Call for Action", Eunomia's event held on 29 September 2016 in Brussels.
- **Newsletters**. We developed text to be included in relevant thematic newsletters and included a link to the survey alongside a brief description of

the project. Examples of the type of organisations that disseminated the survey via their newsletter included:

- Seas At Risk and its members, Brussels based NGO working on marine and maritime issues (www.seas-at-risk.org)
- Sussex Inshore Fisheries and Conservation Authority (www.sussex-ifca.gov.uk)
- European Sea Ports organisation (www.espo.be)

- **Social media (LinkedIn, Twitter)**: We used both LinkedIn and Twitter to promote the survey. Some examples can be found below:





Some examples of twitter handles included:

@WWFEurope, @UNEPinEurope, @blackseacommiss, @HELCOMInfo, @ospar.org.

Eunomia's marketing team contacted the following media list to promote the survey:

Shipping and Marine	.@ShippingMarine	libbie@schofieldpublishing.co.uk
Eco Watch	.@EcoWatch	chow@ecowatch.com
Business Green	.@BusinessGreen	Madeleine.Cuff@incisivemedia.com
Resource	.@resource_media	edward.perchard@resource.uk.com
RWW	.@RWWMagazine	geraldine@markallengroup.com

A summary of the recruitment material is shown in Appendix A.3.0.

Language coverage

The online survey was available in English.

Results

The number of completed survey results were disappointing with 83 results, but only 38 fully complete responses. Many of these completed responses included a high proportion of organisations who were not responsible for undertaking activities in the marine environment, but instead interested parties (e.g. regulators, NGOs).

2.3 Interviews

As agreed with the Commission, Eunomia with the support from the subcontractors conducted targeted interviews through identification some of the most interesting examples identified in the research. Interviews were completed via skype or telephone.

Topic Guide

Each interview was conducted using the agreed topic guide template as shown in Appendix A.4.0. The topic guide template provided the interviewer some of the key questions to be included in the interview. In some cases the topic guide was tailored to meet the needs of the initiative identified, however the main key themes presented were:

- PART A: About your Organisation
- PART B: About your activity / projects
- PART C: Enablers and Barriers
- PART D: Future Plans
- Part E: END (thank the interviewee, ask if they have any questions, provide some information about the next steps)

The interview style was agreed be semi-structured. Thus, the following points of approach were considered:

- Questions are broad and open-ended, rather than tailored for a specific type of answer.
- Questions that can be answered with a ‘yes’ or ‘no’ response should be avoided. It is best to start the interview with easier questions.
- Questions or topics are grouped in themes that follow a logical sequence.
- Sensitive questions are included towards the end, when the interviewee is more likely to be comfortable with the interview.

The template Topic Guide was then shared with the subcontractors to complete the interviews.

Recruitment

Recruitment for project was based on selecting the favourite outputs of the literature review alongside interesting examples identified in the online survey on an ongoing basis (subject to participant’s approval for re-contact).

Following a discussion with the subcontractors, Eunomia and partners started developing a list of examples that were then refined and combined with the Commission’s most preferred examples.

Responsibility

Similar to the Literature Review, Eunomia developed and coordinated the interviews, and was strongly supported by the subcontractors to:

1) Identify the target groups; and
2) Conduct the interviews in the local language

The topic guide and interview questions were shared with the Commission for comments.

Language coverage

The interviews were conducted in the national language in each Sea Basin but the results were recorded in English.

In total, 20 interviews were conducted. A summary of the participants is shown in Appendix A.5.0

2.4 Workshops

This task involved the organisation and delivery of regional workshops with relevant stakeholders active in greening the Blue Economy. The aims of the workshops were threefold:

1) Gather more in-depth knowledge of the selected examples and the actors involved in these initiatives;
2) Identify additional examples and knowledge from other relevant stakeholders; and
3) Test and corroborate the findings from earlier tasks (literature review, survey and interviews).

Workshops were held in two out of the four sea basins. The Baltic Sea event was held in Tallinn, Estonia, and the North East Atlantic Event was held in Brussels, Belgium. Events were originally planned for all four sea basins. Low levels of interest for workshops scheduled in the Mediterranean and Black Sea regions, however, led to these not going ahead.[15]

The approach to organising the workshops is discussed below, according to the individual stages of planning and delivery.

2.4.1 Workshop Preparation

The first task in preparing for the workshops was to compile an invitee list. This was comprised of relevant stakeholders from a number of sources, including:

- Examples identified in the literature review and interviews;
- Respondents to the online survey; and

[15] Some of the possible reasons for low interest in the research are discussed in Section 2.6.

- Attendees lists from relevant industry events.

An invitation was sent via email with a provisional agenda attached. Invitees that had not responded after three to four days were sent a reminder email. Where invitees had not responded after one week, contact was attempted via telephone. If this was not successful, no further attempts at contact were made.

For attendees who did not live or work in the city hosting the workshop, some element of additional travel would be involved. In order to maximise attendance, participation was offered via webinar for those unable to make the event in person.

Workshops were scheduled for half a day. It was thought that people might find it difficult to commit to attending a longer event.

2.4.2 Workshop Facilitation

A chairperson from Eunomia was responsible for facilitating the workshop. This included timekeeping, ensuring that the discussion didn't digress too far from the agenda items and that attendees, including those participating via webinar, had equal opportunity to express their views.

Workshops were held in round table format to facilitate discussion between the project team and attendees. Structured according to the key research outcomes, the main topics of discussion included:

- The level of 'green activity' being undertaken in the region;
- The primary motivations and drivers for undertaking these activities; and
- Moving towards an environmentally-friendly green economy, including barriers, the role of the MSFD and co-operation between different actors.

Attendees were also given the opportunity to voice any recommendations for how to further develop, and accelerate the move towards, an environmentally-friendly Blue Economy.

An example agenda is provided in Appendix A.6.0.

2.4.3 Post-workshop Analysis and Communication

Following the workshop, attendees were given online access to relevant materials from the workshop materials via 'Dropbox'. This included the final agenda, PowerPoint slides, list of attendees, a summary of the discussion points and any relevant documents discussed during the workshops.

2.5 Evidence Synthesis

The information collected through each of the four research methods (outlined in Sections 2.1 to 2.4) contributed to the findings discussed in Section 4.0. This method of 'triangulation' is commonly used to corroborate findings and increase the understanding of particular issues.

When reporting, it is important to be clear about which discrete source of evidence is being drawn upon to ensure that there is no ambiguity as to where the information was derived. This is taken into account in the discussion of findings in Section 3.0, with each source of information clearly referenced. At the beginning of each discussion, the methods that feed into the analysis are clearly outlined along with comments on their suitability for use.

2.6 Limitations

Before discussing the findings, it is important to recognise some of the potential limitations associated with the research methods. Table 2-1 describes some of the key limitations and how they were mitigated.

Table 2-1: Potential Limitations

Limitation	Description of Limitation	Mitigation Measures
Visibility - Project Success	It is possible that successful projects and initiatives were more visible that unsuccessful ones. For example, there is likely to be a larger body of literature surrounding a profitable project that has achieved its objectives compared to one that has failed on these counts. This might distort the research findings in the favour of successful projects.	During the literature review, a variety of search strings were used including 'successful' and 'unsuccessful'. Invitations to participate in the online survey and workshop clearly stated that we were interested in hearing from both successful and unsuccessful projects.
Visibility - Project Publicity	Some projects were more heavily publicised than others. This was found to be particularly true of projects in the renewable energy sector, or projects that receive funding from public sector programmes. The former might be due to investments in PR, whilst the latter might be due to knowledge sharing obligations under the programme from which it received support. As per the previous limitation, the effect of this might be to distort the research findings in the favour of these projects.	In addition to search engines, a range of different information sources as part of the literature, such as industry-specific reports. Inclusion of an online survey allowed economic actors to 'approach' the research themselves instead of being identified through the literature review.
Engagement	Difficulties were encountered when	Efforts were made to advertise

Limitation	Description of Limitation	Mitigation Measures
	trying to engage with relevant operators. This was the case for both the online survey and regional workshops. One possible reason for this lack of engagement is that the idea of greening the Blue Economy is a relatively new and novel area. Additionally, some stakeholders, particularly in the private sector, may not have felt that there was an incentive to them to participate in the research.	the online survey to as wide an audience as possible. This included the use of 'recruitment' posters at relevant events (with a QR code to a mobile-friendly version of the survey), and dissemination through Twitter and within relevant environmental groups. In order to maximise workshop attendance, individuals were offered the opportunity to participate via webinar if they were unable to make it in person.
Survey results	There are questions around the quality of the survey data. A number of respondents were found to have skipped questions or provided nonsensical responses. Furthermore, a large proportion of 'Don't know' responses were given to certain questions, whilst a large number of respondents did not provide basic contact information such as their name or the name of their organisation.	When discussing the results of the survey in Section 4.0 we have referred to broad trends rather than exact figures. Where there are specific questions over the validity of the results these have been included in the discussion. For example, where a large number of 'Don't know' responses might have distorted the findings.

Further to the limitations identified in Table 2-1, it should be acknowledged that the research was not intended to produce an exhaustive list of every project and initiative active in greening the Blue Economy. There will therefore be relevant examples, either past present, or planned, that have not been captured in this project.

3.0 The Blue Economy

Prior to describing the outcomes of the research it is first necessary to provide an overview of the Blue Economy.

3.1 Definition

The Commission has a working definition of the 'blue economy' which is:

> *"Market activity contributing to the EU's Gross Domestic Product that depends intrinsically on the sea."*[16]

According to the Non-paper on the size, nature and dynamics of the blue economy published by the Commission in September 2015[17], the blue economy includes:

> *"Primary sectors, such as transport (shipbuilding, shipping), energy (oil and gas, renewable energy), food (fisheries, aquaculture) and coastal tourism.*
>
> *Secondary sectors such as insurance that provide goods and services to these primary sectors.*
>
> *Smaller sectors such as marine aggregate extraction or communication cable laying."*

This definition is still being finalised by the European Commission, in recognition of the fact that there has not been an agreement so far, either at the national or the European level, as to what the blue economy encompasses, its size, nature or dynamics.

National statistics on the sectors comprising the blue economy are also limited in quantity. Where they do exist, they tend to be of poor quality. This is largely because they are based on the same internationally- accepted definitions of economic activity which were defined years ago and exclude many of the younger emerging industries such as offshore wind or marine biotechnology.

Furthermore, some other issues which have been raised by Member States which make it challenging to settle on a single definition and scope of the blue economy are:

1) How to account for activity taking place outside the EU territory which contributes to the marine sectors within that EU territory;
2) Whether non-market activities such as education, research or defence, that support or protect the blue economy, should be included in the total figures on the blue economy or accounted for separately; and

[16] DG MARE (2016) Note for TG1 - Subject: Size, Nature and Dynamics of the Blue Economy, January 2016
[17] DG MARE (2015) Non-paper on the Size, Nature and Dynamics of the Blue Economy, September 2015, https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/mseg_economic_data_non-paper_3.pdf

3) Whether inland waterways and freshwater aquaculture should be included with other marine transport and aquaculture activities.

3.2 Summary

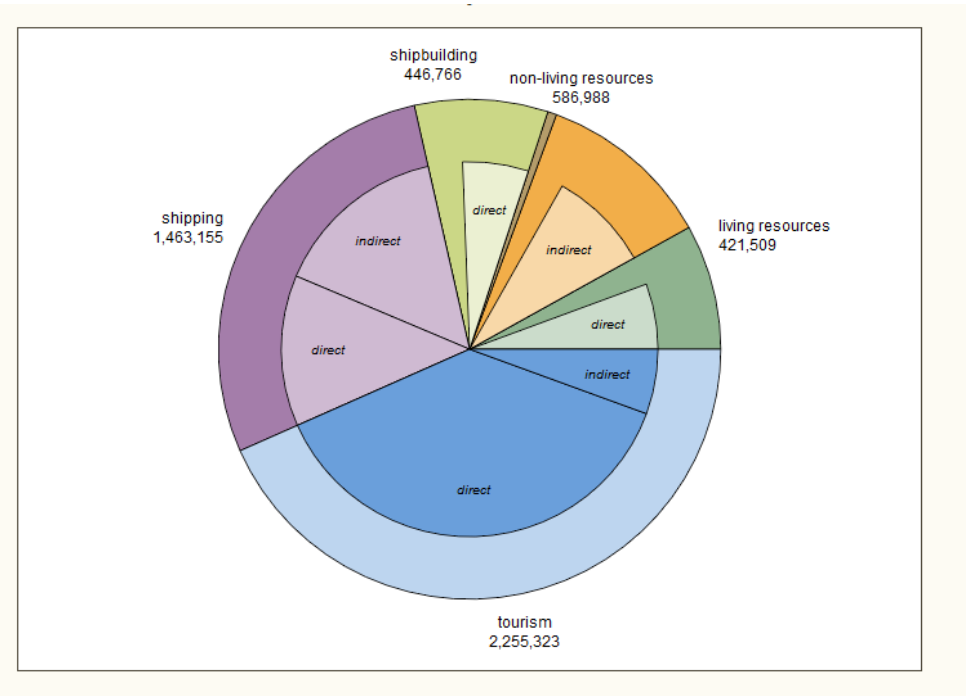
While the concept of the blue economy has not yet been finalised, the concept of blue growth has. A report published by Ecorys et al (August 2012) on Blue Growth[18], estimates that the current size of maritime economic activities in Europe have a total Gross Value Added (GVA) of ~€485 billion and employ a total of ~5.4 million people.

The sectors which are the largest contributors to the GVA are shipping, petroleum and coastal tourism. These values are based on estimates made by the Directorate-General for Maritime Affairs and Fisheries (DG-MARE), with advice from Eurostat and feedback provided by Member States. Where no data exist on Eurostat, other databases have been used such as WindEurope. Most quantitative information currently available focus mostly on employment, because the primary objective of the blue growth initiative is to create and sustain quality jobs.

As indicated within Figure 3-1, six marine sectors account for ~99% of employment in the blue economy. These are living resources (e.g. fishing aquaculture, processing, markets), non-living resources (e.g. oil and gas, sand and gravel, salt), transport (e.g. passenger and freight shipping), shipbuilding (including offshore floating structures and marine equipment), coastal tourism and renewable energy.

[18] Ecorys (2012) Blue Growth: Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts, final report, May 2012, https://webgate.ec.europa.eu/maritimeforum/sites/maritimeforum/files/Blue%20Growth%20Final%20Report%2013092012.pdf

Figure 3-1: Employment in the EU's Blue Economy (2009 to present averages)



Source: DG MARE (2016) Note for TG1 - Subject: Size, Nature and Dynamics of the Blue Economy, January 2016[19]

Despite growing evidence on the some of the activities associated with Blue Growth, it is evident that great uncertainty still exists around what the blue economy encompasses, how big it is and where it's heading. There are a number of contributing factors to why that is:

- Lack of a universally accepted definition of the blue economy;
- Lack of good quality and 'defendable' data on the blue economy across the EU and within each Member State to cover: number of employees; productivity of the sectors comprising the blue economy; and the contribution of each to the national and European Gross Domestic Product;
- The structure of the blue economy, which is split into well-established sectors such as fishing and shipping, for which historic data exists, and new emerging sectors such as offshore wind and marine biotechnology, for which very little quantitative information is available; and
- The range of different sizes of organisations within each sector.

Furthermore, some other issues which have been raised by Member States which make it challenging to settle on a definition and scope for the blue economy are:

[19] The brown segment represents renewable energy.

1) How to account for activity taking place outside the EU territory which contributes to the marine sectors within that EU territory;
2) Whether non-market activities such as education, research or defence, that support or protect the blue economy, should be included in the total figures on the blue economy or accounted for separately; and
3) Whether inland waterways and freshwater aquaculture should be included with other marine transport and aquaculture activities.

All these issues make it challenging for national and EU bodies to agree on the scope and definition of the blue economy. This in turns prohibits the collection of good quality data on the different sectors comprising the blue economy, in order to better understand its size, nature and dynamics.

The data that do exist and have been discussed in this section are based on estimates made by DG-MARE with advice from Eurostat. Where no data exist on Eurostat, other databases have been used such as WindEurope. Feedback from Member States have also been taken into account. What quantitative data are currently available, focus mostly on employment, because the primary objective of the blue growth initiative is to create and sustain quality jobs. DG-MARE is committed to continuing to work with Eurostat, Member States and other relevant stakeholders to settle on a definition and scope of the blue economy and to encourage and support the collection of good quality data on its many sectors.

4.0 Green Activities within the EU28

In the following sub-sections we summarise the key findings from the research discussed in Section 2.0.This section is comprised of the following sub-sections:

- Types of Activities Identified;
- Environmental Impacts Addressed and Motivations; and
- Barriers to Activities.

Case studies from the literature review and interviews have been used to contextualise the findings. These have been anonymised for the purposes of this report.

4.1 Types of Activities Identified

This section is structured according to the following sub-sections:

- The sectors in which the activities operate;
- The type of organisations involved;
- The number of green jobs associated with the activity; and
- The type of business model deployed.

The main sources of information were the literature review and survey. To a lesser extent, it draws upon evidence collected from the interviews and workshops, although the nature of the information collected via these research methods was more strategic and therefore more relevant to Sections 4.2 and 4.3. A summary of the methods used is provided in Table 4-1.

Table 4-1: Summary of the Methods Used

Method	Success at Identifying Activities	Comments
Literature Review	High	The purpose of the literature was to identify a broad range of activities involved with greening the Blue Economy.
Survey	Medium	The purpose of the survey was to supplement and build on the findings of the literature review. It provided an opportunity for individuals to approach the research themselves.
Interviews	Low	Interviews were held with operators identified through the literature review and survey. They were not used as a means of identifying additional activities.

Workshops	Low	Participants within the workshops were encouraged to discuss innovative activities that they had been involved with or were aware of.

When interpreting the findings it is important to bear in mind that the purpose of the research was not to paint a comprehensive picture of the spread of green activity across the Blue Economy. Instead, the main objective was to identify local economic actors involved in the development or commercial application of innovative technologies and methods. This meant that some of the more developed sectors – such as offshore wind, where there are large number of established high value jobs – were not considered.

4.1.1 Types of Activity by Sector

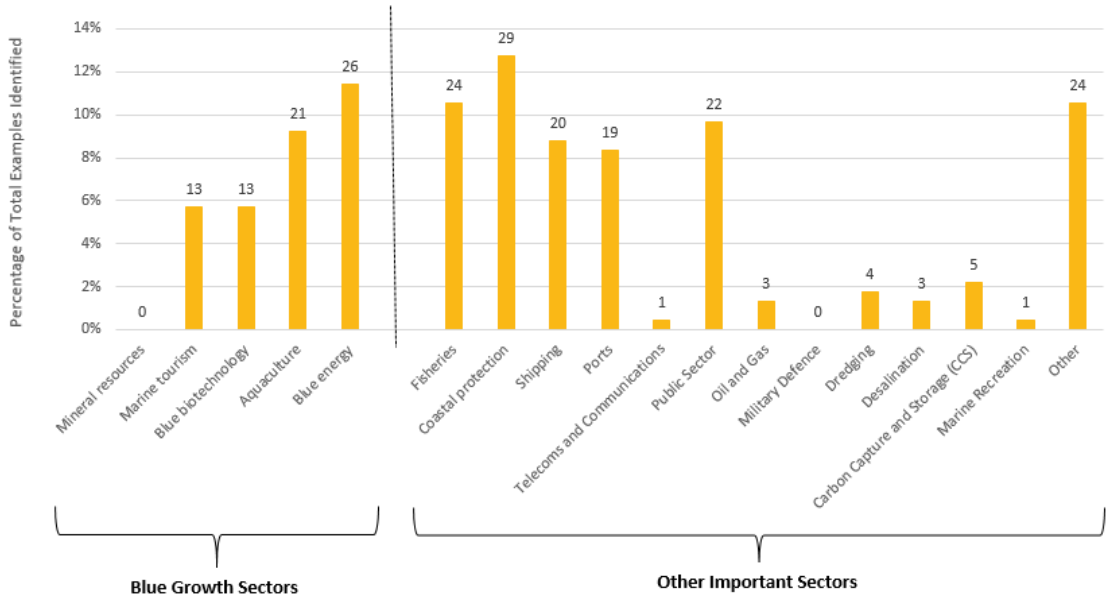
Throughout the research a wide range of activities were identified. As outlined in the previous section, the main method of identification was via the literature review, though a limited number of activities were also identified in the survey.

In total there were 228 examples identified in the EU28 via the literature review. A large number of examples were being undertaken in the more well-established sectors, such as shipping, ports and fisheries. In these cases, 'greening' activity is usually focused upon reducing the impact of an existing practice. For example, the use of alternative fuels or methods of propulsion for vessels, or improved management of waste products such as ballast water and oil.

Figure 4-1 presents the number of activities according to the five focus areas outlined in the Commission's Communication on Blue Growth. [20] It also includes the other sectors outside of these focus areas with the highest identified green activity. Interestingly, it is these sectors that show some of the highest levels of green activity.

[20] Communication from the Commission - Blue Growth: opportunities for marine and maritime sustainable growth (COM(2012) 494 final)

Figure 4-1: Examples Identified by Sector



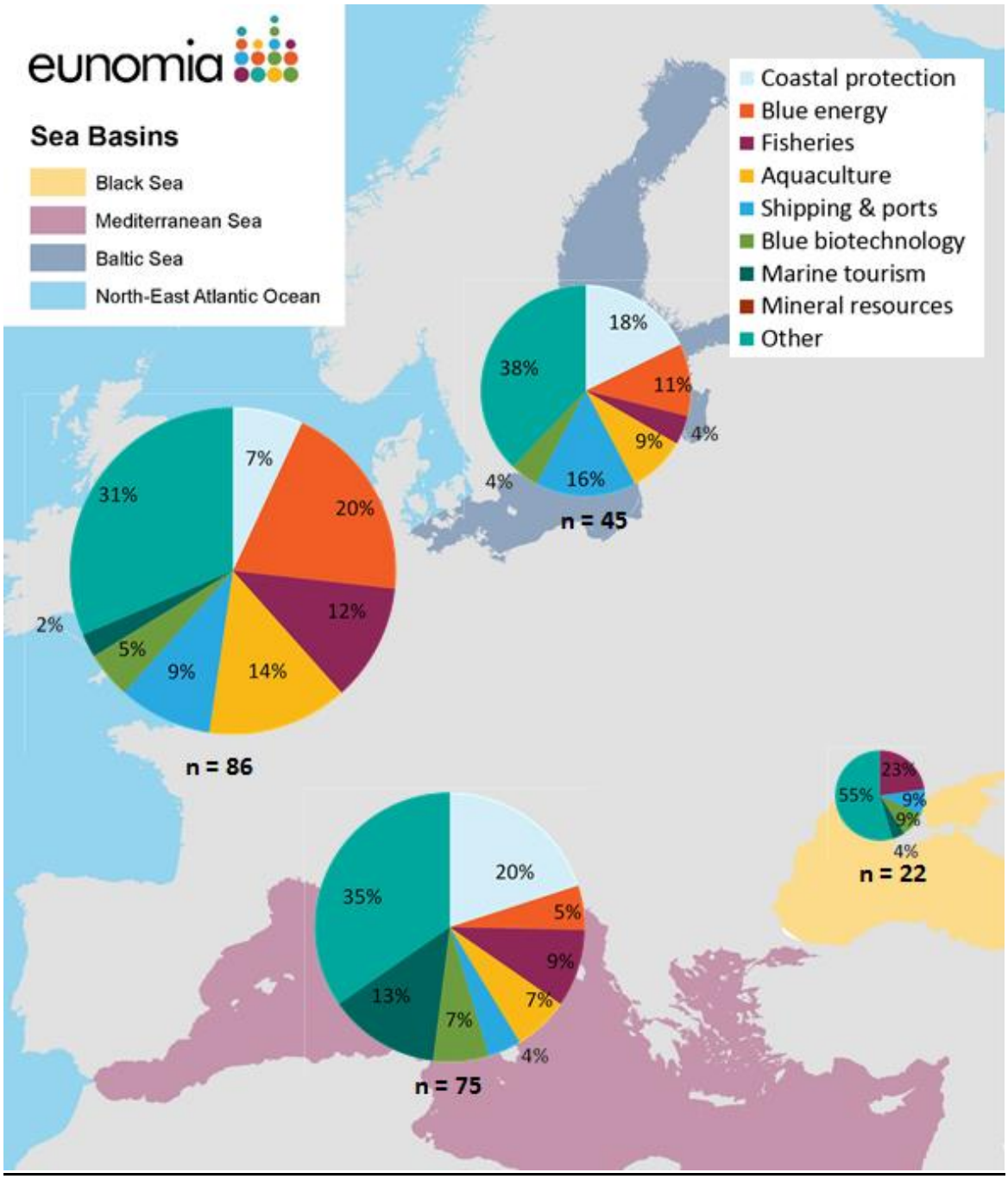
Note: the number of activities identified for each sector is shown at the top of each column.

There was some variance in the nature of activity according to geographic location, as shown in the Mediterranean, for example, where a large part of the economy is geared towards coastal tourism, the majority of green initiatives concern the sustainable management of this activity. There is also a strong focus on fisheries and aquaculture activities.

By comparison, a wider range of activities were found in Northern and Western Member States, in the Baltic and North-East Atlantic Sea basins. The favourable wind and tidal conditions in the latter have led to a large number of activities focused upon the development of marine renewable technologies. At the same time, there is also a focus on the fisheries and aquaculture sectors. Home to a large number of ports and shipping activity, a large proportion of activity in the Baltic Sea region was focused upon improving the sustainability of these operations.

As might be expected, fewer activities were identified in the Black Sea basin, which is bordered by only two EU Member States (Romania and Bulgaria).

Figure 4-2: Distribution of Green Activities across the Four Sea Basins



The findings from the survey largely substantiate the results presented Figure 4-1. The highest number of respondents were operating in the fisheries, aquaculture, shipping and ports sectors. The survey also identified a significant number of activities focused on coastal protection/conservation and the regulation of marine activities. This is indicative of the large number of public sector – or public sector funded – activities in operation, a point that is discussed further in Section 4.1.2.

When compared to overall size of the Blue Economy the number of examples identified in the literature review did not align with the economic output of each of the marine sectors. For example, only a small number of examples were identified in some of the largest economic sectors, including coastal tourism and non-living resources. The rationale for this difference was not observed in the literature but can perhaps be explained by some of the following factors:

- The scale of environmental impact associated with activities within the sector might not be aligned with the economic output of the sector;
- Incentives to reduce or prevent environmental impacts associated with the sector might not be aligned with the economic output of the sector; or
- Efforts to tackle environmental impacts in some sectors may be more advanced than others.

In the following sub-sections we have sought to summarise some of the key trends within the key sectors of the Blue Growth Sectors. A comprehensive list of all activities is included in Appendix A.1.0.

Blue Energy

The blue energy sector has the potential to create new, high-quality jobs across the project lifecycle – from project development and component manufacturing to operations. Whilst some technologies, such as offshore wind, are now being widely deployed on a commercial scale, others are in their infancy. This includes ocean energy.

Both types of technology are listed under the Renewable Energy Resources Directive and are important for the economic development of the Blue Economy. However, as the focus of this study is on more novel sectors, it has given more attention to ocean energy.

Example: Wave energy production in the Swedish west coast

In December 2015, an energy company completed connecting the world's first multi-generator grid-connected wave energy park in Sotenäs municipality, Sweden. Connected to the Nordic Electricity Grid, is the first instalment of a wave power plant, comprised of 36 wave energy convertors and a marine substation.

Example: Tidal Energy

The tidal energy project in Northern Ireland is the world's first grid connected commercial scale tidal device. The device was deployed to demonstrate and test a new turbine technology which consisted of two 0.6 MW generators. Strangford Lough is considered to be one of the best tidal resources in the world. Its sheltered environment and easy access also makes it an ideal demonstration site for tidal energy.

The project is currently in the decommissioning phase, with four to five individuals working on it full time. During the design and installation phase, this was as many as 40 FTEs.

A number of wave and tidal stream technologies were identified in the literature review at demonstration and, in some instances, early commercial stages. The potential for wave and tidal energy is not uniform across the EU28 and it appears that examples have been centred in northern and western regions. Many of the marine renewable examples identified sought to adopt a collaborative approach, with much of the competition focussed primarily on accessing public and private sector funding. Many of the examples identified in the research had a focus on developing technical standards that could be adopted sector wide. Such activities took place in dedicated test centres that aimed to facilitate the commercial deployment of the technologies.

Ocean energy faces a number of challenges if it is to develop its full potential. Moving from demonstration to commercialisation is a notoriously difficult step to make for emerging technologies. In order to scale-up and increase competitiveness, consideration will need to be given to, inter alia, how to reduce technology costs and improve access to finance.

Blue Biotechnology

Blue biotechnology is another highly innovative sector that growing apace. Here, organisations are aiming to provide innovative products (for example, cosmetic products using extracts from marine organism, or the use of microalgae as a biofuel) and also create new markets for products that didn't previously exist (such as research into new anti-cancer drugs). This sector produced some of the most diverse and innovative organisations, with a wide range of activity.

Example: Marine-based drugs to fight cancer

A Spanish pharmaceutical company is conducting a pioneering marine biotechnology programme in search of new anti-cancer drugs. The company employs experts in marine biology who explore the oceans in search of small marine samples in select locations. All samples are collected manually and selectively minimising the interaction with the environment. Molecules of interest are isolated and from them antitumor molecules are designed and synthesized.

At the time of writing, commercialisation begun on the first anti-cancer drug of marine origin.

Like many other sectors in the marine environment, the blue biotechnology sector is heavily dependent on knowledge of the seas and oceans. Participants in the research stated that knowledge of marine resources were crucial in helping to enable such activities; thus they supported the promotion of open data initiatives. A common theme with this sector was the involvement of universities and research institutions in undertaking many of the activities identified in the research.

Example: CO2 capture and bio-fixation through microalgal culture

This project aims to demonstrate an efficient way to capture CO2 from stationary sources by capturing CO2 emissions from Gas fired power plant and using them to culture microalgae. The project also aims to demonstrate that CO2 emissions can be used as a substrate for biomass algae production and plans to grow in excess of 200 tonnes of algal biomass per year.

When considering activities within this sector, the question remains whether the nature of the jobs created are intrinsically 'green' and, if so, what environmental impact is it that they are seeking to address. We identified a number of examples that would undoubtedly be good examples of 'blue' growth, but it is unclear to what extent these are 'green' jobs as defined within this project.

Aquaculture

A large number of examples were identified in the aquaculture sector, especially within the North East Atlantic region. These can be broadly categorised into two groups: shellfish and finfish cultivation.

Shellfish aquaculture, such as mussel or oyster bed cultivation, offers a variety of ecosystem services (as well as provision of food). This includes nutrient removal, turbidity reduction and improved habitat quality for fish. Whilst there is no question whether this approach is effective – it has been demonstrated by a range of studies – there are questions over the economic potential of such approaches. For example, a number of examples sought to examine whether more sustainable aquaculture could provide the same services in as cost effective manner as conventional alternatives.

Activities relating to finfish aquaculture typically involved research into more sustainable sources of feedstock and more efficient energy and waste management processes. There was a strong focus within many of the examples of integrating aquaculture with other economic activities, such as aquaponics. A number of novel approaches have been identified, such as using feedstocks derived from algae and the use of nutrient-rich by-products to grow plants. Such activities tended to be undertaken by SME's on a relatively small scale.

Other activities involving finfish included efforts to reduce water consumption via the use of recirculated water and the prevention of disease by identifying alternative feedstocks for the fish. These efforts were primarily focussed at lowering the costs associated with finfish aquaculture but also aimed to deliver some environmental benefits.

Example: Integrated brackish aquaculture

Aquaculture, whether at sea or in closed systems, can be made more sustainable by combining fish farming with seaweed cultivation. This is called 'integrated aquaculture'. Fields of seaweed are planted around fish farms. The seaweed absorbs and uses the minerals that are excreted by the fish, reducing coastal water pollution.

Because it can make fish farming more sustainable, integrated aquaculture is attracting interest from industry and government. Supported by the European Fisheries Fund, several fish farmers and a leading university launched the project with this aim in mind. The turbot farmers involved had previously used recirculation (RAS) systems, where waste water treatment constitutes a considerable overhead cost. They hoped to develop a more sustainable system that could reduce both waste water flows and costs.

The project team added seaweed cultivation to the process, creating a recirculation system where the waste water was treated naturally. The project contributed to the development of new cultivation technologies in this area. One of these involved attaching young seaweed to 'carrier' ropes or nets before deployment in tanks or at sea.

Coastal Tourism

Within the Mediterranean Sea a high proportion of activities were found to be concentrated in the coastal tourism sector. These activities tended to be focussed on the coastal tourism sector and promoting more sustainable practices within the sector. In some cases activities were aligned with other ancillary activities such as coastal remediation and protection. In such instances, it appears that the primary aim of the tourisms aspects of the activities is to generate revenue to support environmental activities.

The coastal tourism sector has the highest turnover of all the industries included within this study. It might therefore be considered surprising that so few examples were identified. It is worth reiterating that the research was undertaken through a critical lens, aiming to identify activities that explicitly sought to reduce environmental impacts. Many activities were identified as being aimed at holiday makers within the mass market, with relatively minor consideration for the environmental impact. Accordingly only activities which demonstrated strong engagement with environmental issues were recorded.

A number of projects were identified that sought to further the development of ecotourism in the EU. This includes strategy, networking opportunities and community engagement. These activities were typically coordinated by the public sector, however, and therefore would have been captured under this category.

Example: Eco-touristic valorization of the salt-pans between Italy and Slovenia

The project combined sustainable tourism and nature conservation activities. The objectives were to introduce a strategy for the sustainable use of salt-pans, to promote the local production of high-quality salt and to promote educational scientific tourism. Part of the strategy was to restore nature trails in an environmentally-friendly way, such as through the use of weather-resistant wood without the use of chemicals.

Marine Resources

It is particularly interesting that very few examples of green activities were identified in the mineral resources sector. Identified as key area by the Commission in light of increased demand for non-energy raw materials associated with the growth of emerging economies, the lack of greening activity in a sector that necessitates the use of specialised vessels and complex underwater handling procedures is perhaps surprising. Referring back to the limitations identified in Section 2.6, however, this could be indicative of low visibility in this sector rather than a lack of activity altogether. Where activity was identified it was typically associated with reducing the environmental impacts associated with dredging, for example via the use of freeze dredging techniques.

4.1.2 Types of Organisation

The types of organisation identified in the literature review are shown in Figure 4-3. Although the greatest proportion lie within in the private sector, a large number were being undertaken by the public sector, research institutions and NGOs. In some ways, this accounts for the significant number of activities that relate to coastal protection (see Figure 4-1). Related to the conservation, restoration and/or sustainable management of coastal habitats and species, these are activities that are more commonly undertaken outside of the private sector.

By comparison, only a small proportion of survey respondents were from the private sector. The majority were instead associated with the public sector, research institutions and NGOs. One possible explanation for the low private sector representation might be due to a lack of engagement. The idea of greening the Blue Economy is a relatively new and novel area. It is possible that they do not see any personnel benefits to participating in the research or engaging with the topic more widely. This is discussed further in Section 2.6.

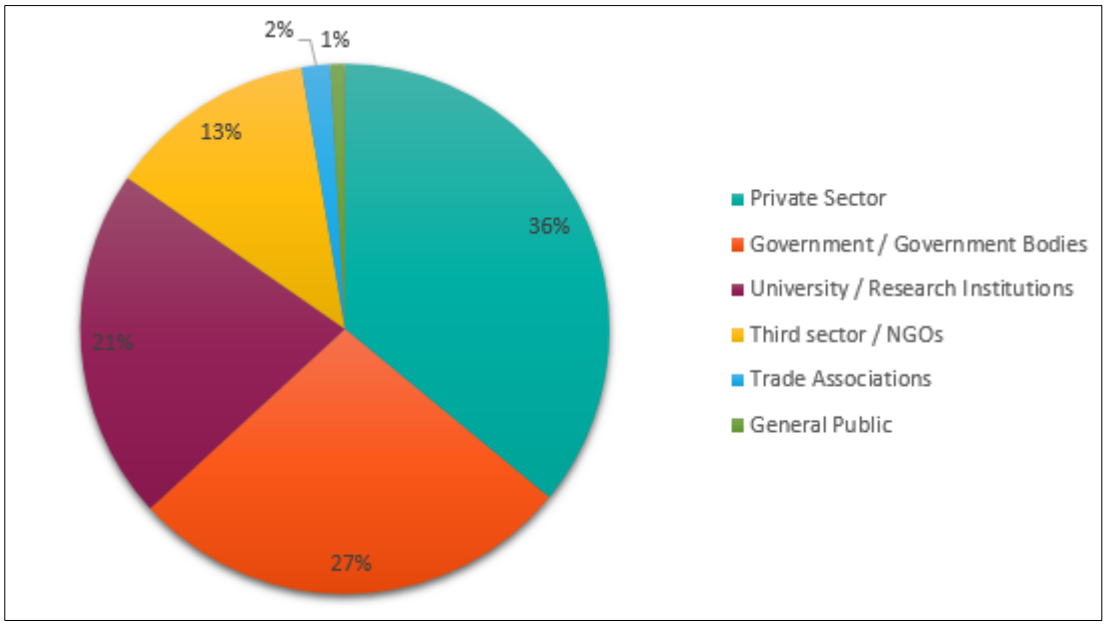
Further examination of the results from the literature review showed that 80% of the activities identified within the literature review received financial support from public funds. This is a significant proportion. Typically, this support came from EU structural funds, or research and innovation programmes grants. It was also received through the allocation of grants by national authorities.

By comparison, a quarter of survey respondents reported that their activity had received financial support. However, 40% of respondents were 'unsure' about whether or not they had received support, bringing the usefulness of these findings into question.

The key message seems to be that public finance is playing a large role in greening the Blue Economy, either through the creation of jobs in the public sector or through support in the form of funding and grants. A large proportion of this support was being directed towards universities and research institutions.

Anecdotal evidence from the workshops suggests that the development of many innovative new technologies and methods, such as the use of microalgae for waste water treatment, are far from reaching a level of readiness that is close to commercial application. This is not to say that these resources aren't being put to good use. Rather, it suggests that commercial viability of some new applications in many of these sectors is still some way off.

Figure 4-3: Type of Organisations Identified in Literature Review



A substantial number of activities were being undertaken by organisations in the third sector or NGOs. In many cases, these were directed towards addressing market failures rather than the development of innovative new products or services. An example of this is "The Ocean Cleanup", an initiative that is developing technologies to remove the plastic contaminated the world's seas. [21]

[21] https://www.theoceancleanup.com/

4.1.3 Number and Types of Green Jobs

Data on the number of jobs involved in the activities was particularly hard to identify as very little published information appears to exist on this issue. Additionally, the primary research was also relatively ineffective as many participants had limited knowledge of the precise number of jobs involved in their activities.

The results of the literature review and survey revealed that the number of jobs associated with green activities were typically small – with less than 10 direct FTEs associated per activity. This is not to say that activities involving a large number of green may not exist. Organisations with an engineering or technical focus, such as marine renewables, often had a large number of high value green jobs associated them. This includes direct jobs related to design and development, but also those related to manufacturing and other parts of the supply chain that are more difficult to quantify. However, as mentioned in Section 1.2, offshore renewable activities were not a focus area for this study.

The low number of jobs might be due to a number of reasons. In the private sector, many of the individuals undertaking green activities were operating within small teams within a larger organisations (discussed further in Section 4.1.4) and thus they only accounted for the staff directly working on the activities, rather than all staff in the organisation.

With regards to public sector, NGO or university based activities it is more likely that the scale of funding provides some limitation on the number of jobs directly supported. Many organisations in these sectors appear to benefit from publically funded R&D research grants and thus the quantity of jobs are limited by the size of the grant.

Additionally perhaps another reason why job creation appears to be low is that activities in the marine environment can be more capital intensive (e.g. requirements for vessels) and thus less money is available for direct job creation.

4.1.4 Business Models Deployed

Throughout the research a range of business models were identified that were being used to develop and deploy activities.

Of the activities being undertaken in the private sector, most of these were integrated into larger, well-established companies, typically within a dedicated research and development team. Examples of this include a team within a multi-national oil company exploring the use of algae oils for biofuel, or individuals within a port authority responsible for green strategy and its implementation.

There were few examples of innovative start-ups operating in the Blue Economy. Of those that were, many of these were built upon community-based business models. These were most prevalent for smaller industries, such as fisheries and aquaculture, which can sometimes have lower capital requirements.

Start-ups face a number of barriers to market entry, and it is possible that these are simply precluding these organisations from establishing themselves within the Blue

Economy. Access to finance was the most commonly cited barrier from the interviews and is discussed further in Section 4.3.2. Indeed, this was one of the main issues identified in a report produced by the UK Marine Industries Alliance on a growth strategy for marine industries.[22]

Example: Ethical fishmonger

Located in UK, the ethical fishmonger is a social enterprise owned by and benefitting the fishing community. Its objective is to create a stable market and distribution system for a network of small-scale fishers.

Fishers receive fair prices, boosting their local economies, and are rewarded for fishing with environmental sensitivity. Customers receive honestly priced, high quality fish direct to their homes around the country via one of the UK's largest organic food box schemes. The business also aims to support scientific research through the involvement of local university students who go out on the boats to monitor adherence to the organisation's code of conduct.

4.2 Environmental Impacts Addressed and Motivations

Further to examining the nature of the activities, it is important to consider the environmental impacts that they seek to address, and the motivations for doing so.

The discussion in this section draws upon evidence from across the four research methods. The qualitative nature of interviews and workshops were particularly useful tools for understanding the motivations behind individual activities.

Table 4-2: Summary of Methods Used

Method	Success at Identifying Activities	Comments
Literature Review	Medium	The nature of the literature review meant that it was not possible to identify some of the underlying motivations for undertaking activities, although environmental impacts were often more easily discernible.

[22] UK Marine Industries Alliance (2011) *A Strategy for Growth for the UK Marine Industries*, September 2011, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/31813/11-1310-strategy-for-growth-uk-marine-industries.pdf

Survey	Medium	As per the literature, it was not possible draw out some of the nuances associated with the motivation in the survey. Questions were included on environmental impacts.
Interviews	High	Interviewees were asked about their motivations and the environmental impacts that their activities addressed.
Workshops	High	Participants within the workshops were encouraged to discuss environmental impacts and motivations.

4.2.1 Motivations

For the purposes of the literature review, activities were categorised according to different types. These are as follows:

- **Improvement to the environmental performance of operations:** for example, where a private organisation makes an investment with a view to improving the sustainability of an operation. This might be in relation to pollution or resource efficiency, and could be in response to stakeholder concerns, environmental legislation or to improve the operation's bottom line;
- **Policy analysis, sustainable development and R&D:** for example, the consideration of strategies relating to the sustainable management of marine areas, collaborative working between organisations in a supply chain or environmental monitoring. Another example would be where research institutions or private organisations undertake R&D activities. Therefore, these innovative activities that are sustainable when scaled up they reduce harm to the environment; and
- **Operations appealing to the 'green' market:** private organisations hoping to tap into the 'green' or 'eco-friendly' market for products and services, such as ecotourism.

Figure 4-4: Identified Motivations from the Literature Review

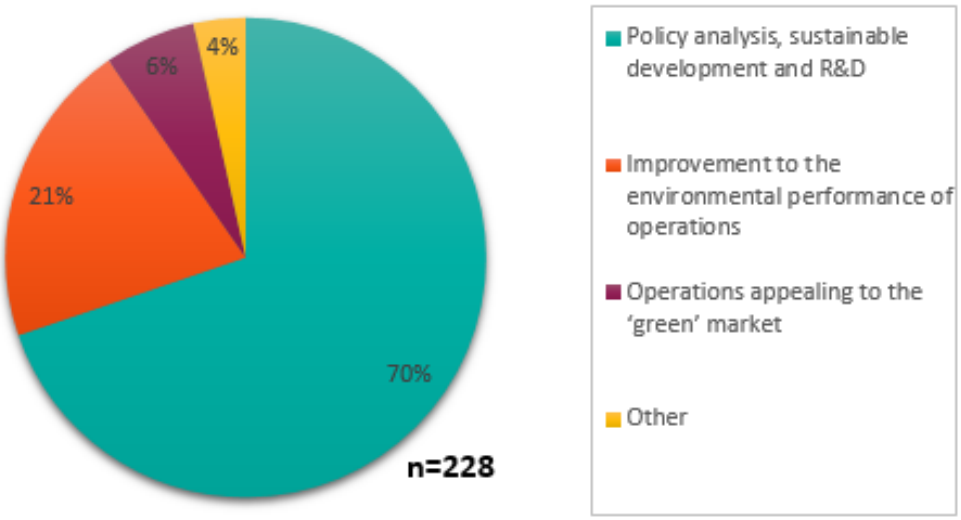


Figure 4-4 demonstrates a break-down of the motivations identified within the literature review. There were a range of motivations identified, but the majority were those relating to the "Policy analysis, sustainable development and R&D" category. The following sub-section discusses the motivations behind undertaking activities, structured according to the categories above.

4.2.1.1 Improvement to the Environmental Performance of Operations

One fifth of the activities identified in the literature review were understood to be operating with an overarching objective of improving environmental performance. This was most common in private sector organisations, where the results of the interviews and workshops there are a number of motivations for improving environmental performance for those looking to make a profit.

A common motivation for organisations looking to improve the environmental performance of their operations was financial. A notable finding from the research was that there were very few examples of where it truly pays to 'go green'. In other words, where an organisation has generated greater levels of profit as a result of improving the environmental performance of its operations. Instead, financial motivations are influenced by the availability of external support. This is deliberately targeted at more novel emerging technologies that align with EU or national policy. Activities concerning blue biotechnology and marine renewables, for example, were both highly likely to receive financial support.[23]

[23] 11 out of 13 blue biotechnology activities and 23 out of 26 marine renewables activities received some form of financial support.

Disseminating new knowledge, allowing others to benefit from the results, can add to the value of these activities. However, this wasn't something that always identified as a key objective, especially this would mean that competitors would benefit. Thus it could be said that there are limitations to the funding of R&D in the private sector where adequate provisions for knowledge sharing are not in place.

Private sector organisations also referred to corporate social responsibility (CSR) as a principle reason for undertaking greening activities. Unsurprisingly, this was most prevalent in organisations that are particularly visible to the public. In the shipping sector, the successful demonstration – and communication – of its environmental credentials can provide an added advantage and brand value in what can be a competitive industry. In some cases, CSR may also contribute indirectly to an organisations cost advantage due to improved environmental performances, in which case the two motivations of CSR and increased profits become intertwined.

Example: Hybrid ferries

The ferry company, which operates on routes between Germany and Denmark, aims to have a fleet of six hybrid ferries using zero emission batteries by 2018. These 'plug-in' ferries can be charged where docked and will run purely on battery power during the first and last 20-minute periods of the voyage. The batteries will then recharge during the middle part of the voyage when diesel engines will be used.

Despite typically being public bodies, the literature review revealed port authorities as being particularly involved in CSR. This is due to a number of factors, such as their role in shaping the development and sustainability of local communities, the increasing role of private capital in port infrastructure development and increased competition for customers. Ports across the EU are implemented 'green strategies' with a view to establishing themselves as organisations that are engaged with environmental issues. Broad in their nature, these strategies often concern the use of renewable energy, energy optimisation, waste management, water consumption and various other aspects of daily operation.

Regulatory motivations were also found to be an important impetus. There is a large amount of regulation targeted at the marine and maritime industries, coordinated at a variety of scales. One particular regulation that has had a positive impact is the MARPOL Convention, which includes regulations aimed at preventing and minimising pollution from ships.[24] Once such requirement is that ships restrict the sulphur content of their fuel. Since January 2015, ships trading in designated emissions control areas are required to use fuel with a sulphur content of no more than 0.10%. This led to an increase in the number of ships fitted with scrubbers of various types to reduce the sulphur emissions,

[24] International Convention for the Prevention of Pollution from Ships (MARPOL), adopted on 2 November 1973

ranging from open-loop (discharging the wash water into the sea) to closed-loop (disposing the residue in port reception facilities), with hybrid scrubbers supporting both modes of operation.

In view of ongoing discussions about the impacts of open-loop scrubbers on the marine environment, this study refrains from making a decision on how "green" the associated jobs are. A credible case could be made, however, to count the jobs involved refinery-side in the desulphurisation of heavy fuel oil under this label. Apart from scrubbers, the convention has also contributed to a shift in the shipping sector towards hybrid models using methods of propulsion, such as electricity and liquefied natural gas. In this way, jobs are created across a range of areas, from research and development to waste management.

Broader EU legislation was also cited as being influential. The Marine Spatial Planning Directive[25] and MSFD[26] were particularly instrumental, whilst EU policy around waste and energy were also noted as drivers of green activity. Ensuring legislative compliance is a key consideration of any organisation. One reason why the results might show a large number of jobs in existing organisations is the result of increasing environmental requirements upon them. In larger organisations such employees might be highly visible – i.e. those working as part of an environmental or sustainable team. In small organisation, perhaps where responsibilities associated with compliance are share across role, these jobs might be harder to identify.

4.2.1.2 Policy Analysis, Sustainable Development and Research & Development

Over two thirds of activities identified in the literature review involved some form of policy analysis, sustainable development initiative or research & development activity. This is a significant proportion of the total.

These activities are characteristic of the public sector, or those organisations that are receive large amounts of financial support, such as universities or NGO's. It is understood that the EU and its Member States spend approximately EUR 2 billion a year on marine research. Over EUR 260 million comes from the Horizon 2020 research and innovation programme. A specific 'blue growth' focus area targets cross-cutting marine and maritime research and supports ocean-related policies, including fisheries, offshore energy and maritime transport.

[25] Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 Establishing a Framework for Maritime Spatial Planning (OJ 257/13, 28.8.2014)

[26] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (OJ L 164, 25.6.2008)

When we consider that 48% of all activities identified were undertaken by the public sector, universities or research institutions, and that over 80% of all activities received some form of financial support, the context of this result can be better understood.[27]

Sufficient financial support must be secured in order for the activity to go ahead. However, environmental considerations are often the central focus. In a broad category such as this, these are highly varied. A number of these activities were regional responses to environmental legislation, such as the Marine Strategy Framework Directive.[28] Such was the approach taken by Bulgaria and Romania. Other collaborative efforts were direct responses to environmental issues, common across the coastal protection, fisheries shipping sectors in particular. Bringing together multiple stakeholders and economic actors in this way offered a more holistic approach to addressing environmental concerns.

Example: Fisheries management project

The purpose of this project has been to devise a 'responsive fisheries management system' in collaboration with key stakeholders in European fisheries. Its vision has been to contribute to a fundamentally new approach to fisheries management in Europe that can be accepted by stakeholders, governments, authorities and industry alike, and thus have a significant impact on the future of fisheries policy.

The system outlines a process for transferring responsibility for fisheries management to fishermen (resource users), provided that they document and achieve specified management objectives. Ecological, economic and social aspects are taken into account, as well as ways to improve cooperation and mutual understanding between policy makers and stakeholders to facilitate its implementation. Stakeholders' involvement is strengthened by taking into account their knowledge and requirements.

Universities or research institutions that receive financial support may act differently to private sectors recipients. As discussed in Section 4.2.1.1, private organisations might be reluctant to disseminate new knowledge, but are focused on developing new technologies or methods for commercial use. By comparisons, researchers may have dissemination at the heart of their strategy, and commercialisation less so.

[27] As discussed in Section 2.6, this high proportion of activities identified that receive financial support is not necessarily representative of green activities more widely. It may instead be a function of the visibility of this type of work. However, the results of the survey also demonstrate a high proportion of activities undertaken by the public sector, universities or research institutions.

[28] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (OJ L 164, 25.6.2008)

Also included within this category are the jobs directly associated with the administration, governance and the development of policy and regulations. Often a function of public bodies, these positions would not exist without the presence of the legislation – a cause of concern for their longevity.

4.2.1.3 Operations Appealing to the 'Green' Market

At around five percent of all activities identified, considerably fewer activities were categorised as those appealing to the green market. That is, appealing to discerning customers with environmental dispositions. Individuals representing these organisations might argue that their motivations are purely environmental. Indeed, activities in this area may be focused upon the sustainable use of the seas or conservation, with many tying in socially responsible practices as well. However, even non-for profit companies have overheads to pay, and so financial performance will always have a significant role to play.

Interestingly, these activities were only identified within the fisheries, aquaculture and coastal tourism sectors. These are industries where human impact on the natural environment has typically been more visible and where public concern is greatest. This is discussed further in Section 4.2.2. In the fisheries sector, ethical fishmongers are one avenue by which such concerns are being addressed. These aim to create a stable market and distribution system for fishers that demonstrate their sustainable practices and environmental sensitivity. Offering fair prices creates a mechanism by which these fishers are rewarded financially for doing so.

By their very nature, these activities are small-scale and run with community interests at their heart. Thus the number, and often value, of the jobs associated with them is low. Interviewees representing some of these organisations were keen to stress the success of such organisations. This would suggest that there is market share to accommodate a greater number of these types of organisations, and more jobs by association. As discussed in Section 4.1.4, start-ups face a number of challenges in getting off the ground, especially access to finance. Addressing this issue could go some way to increasing the presence of these organisations in the Blue Economy.

Example: Ethical fishmongers

This ethical fishmongers is a community supported fishery operating in the UK. Founded by a marine biologist and an aquatic ecologist, it aims to change the way customers buy fish, bringing fresh, most responsibly sourced seafood. The operation works directly with a handful of fishers that they know and trust. By buying directly from the source, fishers are paid a fair price for their catch – one that reflects their responsible fishing practices. The organisation employs two people directly and works with six fishermen.

4.2.2 Environmental Impacts

As well as motivations, it is important to consider the environmental impacts that activities were seeking to address. For the purposes of the literature review and survey, these were categorised according to the environmental themes outlined in the revised Marine Strategy Framework Directive. These are as follows:

- Substances, litter and energy;
- Biological; and
- Physical

Each theme has a number of environmental pressures associated with it. These are shown in Table 4-3.

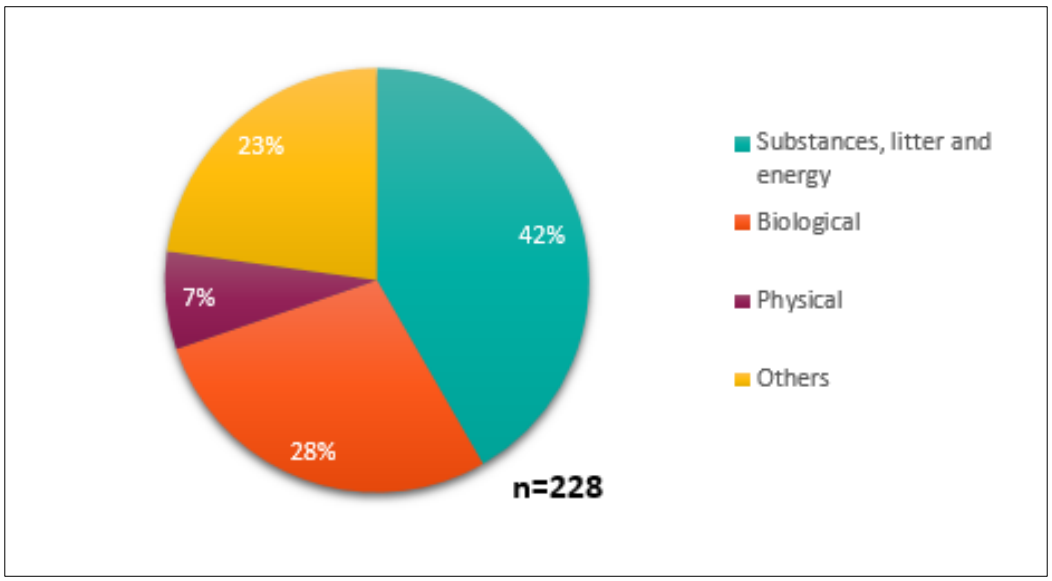
Table 4-3: Environmental Pressures by Theme

Environmental Theme	Environmental Pressure
Substances, litter and energy	• Input of nutrients • Input of organic matter • Input of hazardous substances • Input of litter • Input of anthropogenic sound • Input of other forms of energy
Biological	• Input or spread of non-indigenous species • Input of microbial pathogens • Input of genetically-modified species and translocation of non-indigenous species • Loss of, or change to, natural habitat by cultivation of animal or plant species • Disturbance of species due to human presence • Extraction of, or mortality/injury to, wild species, including target and non-target species
Physical	• Disturbance or damage to seabed • Extraction of seabed substrate • Change of seabed substrate or morphology • Changes to hydrological conditions • Input of water • Extraction of water

By their very nature, 'green jobs' cover a wide range of environmental issues. This is demonstrated by the breadth of the UNEP and OECD definitions discussed in Section 1.3. Thus it is not always accurate to say that a particular green activity is focused on only

one environmental issue. However, for the purposes of this analysis, only the primary environmental impact has been considered. This is shown in Figure 4-5.

Figure 4-5: Type of Primary Environmental Impact Addressed



The majority of activities focused their efforts on environmental impacts related to substances, litter and energy. The most commonly occurring pressure within this theme related to the input of nutrients and occurred in the North-East Atlantic Sea Basin. This is shown in Appendix A.7.0, which plots the environmental pressure being addressed by sea basin. The prevalence of marine renewables and carbon capture and storage projects, as well as the exploration of alternative fuel types for vessels, identified in this region go some way to explaining this concentration of activity.

The input of litter was the focus of a significant number of activities, particularly in the Mediterranean and North-East Atlantic. These are initiatives that are commonly undertaken by public bodies, NGOs and the third sector. The response to cleaning up Europe's seas is no doubt partly attributable to the attention the issue has received in environmental legislation, such as the MSFD (as discussed in Section 4.2.1). It may also be that such initiatives are well publicised, and therefore more visible online.

To a lesser extent, activities centred their efforts associated with biological themes. Most of these activities were involved with minimising the extraction, injury or mortality of wild species by fishing or other activities. This was typically undertaken by those operating in the fisheries or aquaculture sectors themselves. For example, through the promotion or application of environmentally-friendly, low impact techniques.

Physical environmental impacts were the primary focus of just seven percent of activities. Issues such as seabed disturbance and changes to hydrological conditions are arguably less high on the environmental agenda. Given the high proportion of activities that were associated with a CSR strategy, organisations may chose to focus their time and resources on the issues that are of greatest importance to their stakeholders.

The results of the survey largely substantiate the findings from the literature review: most activities were seeking to reduce the environmental impacts associated with substances, litter and energy, whilst few efforts were focused on physical impacts. Interestingly, even fewer were looking to reduce biological impacts. However, the result may have been distorted by the one third of respondents who were unable to categorise their activity. This also suggests that respondents had some difficulty in applying these themes to their activities.

Although there is evidence of some environmental pressures receiving more attention than others, the results point towards a broad range of pro-environmental activities. What they do not show, is the extent which these activities are effective. That is, how green are they? How much positive impact are they actually having? What can be considered the best environmental option? This is something that has not been examined as part of this study. The Commission may wish to investigate this further, perhaps with regards to the most efficient allocation of financial support.

4.3 Barriers to Activities

Alongside highlighting the successes of activities, it is also important to consider the barriers and issues that organisations have faced when developing green initiatives. In this research, barriers have been identified in two main circumstances:

1) Barriers and issues which have impacted on successful activities. In these cases, the barriers and issues may have been overcome, or initiatives sufficiently adapted so to ensure that they can take place.
2) Barriers and issues which have impacted on unsuccessful activities. In these cases, the barriers and issues have prevented initiatives from being undertaken successfully.

One of the aims of the research has been to identify not just those activities that have been successful, but also those which have been attempted and failed. Thus identifying activities in the second category has also been important. It should be noted that failed initiatives are typically harder to identify – people naturally declare their successes, but rarely their failures. Accordingly, some of the techniques used in the research have been more successful than others at identifying them, as shown in Table 4-4.

Table 4-4: Summary of Methods Used and Identification of Failed Green Initiatives

Method	Success at Identifying Failed Activities	Comments
Literature Review	Low	Much of the literature is purposely written to identify successful actions. Thus failed activities were seldom referred to.

Survey	Low	Many of the survey respondents aimed to purposely highlight their successes in the survey.
Interviews	Medium	Whilst derived from the literature review many of the organisations involved in successful activities were also involved in failed activities.
Workshops	Medium	Participants within the workshops were encouraged to discussed failed activities.

As explained in Section 3.0, the Blue Economy is comprised of a wide range of economic activity, comprising of a range of organisations in different markets. As to be expected, a wide range of barriers and issues have been identified in the research. Before these are discussed further, it is worth framing them in the wider context.

Due to the nature of the research methods, the distribution of the barriers and issues identified were predominantly focussed on successful activities (i.e. barriers and issues which did not ultimately prevent activities from taking place). It is therefore cannot be said with certainty that major barriers which have prevented activity from taking place have been identified.

Additionally, it is worthy of mention that the types of barriers and issues discussed were not always associated with more environmentally-friendly activities. In some cases, barriers and issues were raised that would have impacted on any organisation trying to develop, regardless of whether or not they were related to promoting more environmentally-friendly practices. For example, the role of monopolistic market structures and practices were cited by a number of organisations that prevented new organisations from gaining market share. Whilst these are not the primary focus of the research, they should not be dismissed as they will impact on environmentally-friendly activities and non-environmentally-friendly activities equally.

4.3.1 Market and Economic Barriers

Some of the most important barriers identified by organisations related to the market and economic contexts within which they operated.

A small number of organisations expressed a view that undertaking more environmentally-friendly activities is often uneconomic, and that organisations were disadvantaged when compared to competitor organisations. This is because the benefits of being 'green' (i.e. reducing externalities) were not recognised in current market prices for many goods and services. This issue was raised by organisations operating across different sectors and not limited to a single industry or type of activity. However, the majority of examples were raised in traditional economic sectors, such as shipping and fishing. In some cases, this appears to have deterred some organisations from undertaking more environmentally-friendly activities.

Alongside these issues, other concerns were raised by some participants of the research with regard to competition with existing organisations. In some more established

sectors, such as the ports and fishing industry, larger organisations undertook what was described by some participants as monopolistic practices that prevented new organisations from gaining market share and undertaking more environmentally-friendly activities. This issue was described in the workshops in Tallinn and Brussels, where the role of vertically integrated value chains and monopolistic activities had prevented some more environmentally-friendly activities from being undertaken. In the case of the ports sector, the role of port operators also acting as local regulators was also discussed as sometimes being detrimental to efforts to promote more environmentally-friendly activity.

Additionally, one private sector organisation cited the involvement of the public sector in the market as a barrier to their development. This was in reference to state-owned transport links in Denmark that are competing with the private sector, where advantages such as increased access to finance result in an uneven playing field.

4.3.2 Availability of Finance

A common barrier and issue raised by participants was the availability of funding, particularly associated with early stage finance. A small number of participants highlighted issues around the risk of some more environmentally-friendly activities being too great, and that suitable debt or equity arrangements were not available. This was true for a range of sectors, including, but not limited to, coastal tourism, fishing and blue-biotechnology.

Despite this issue being raised by a number of organisations, as highlighted in Section 4.1, many of the organisations had been successful in obtaining some sort of finance (typically grants) to develop their activities. Thus it was unclear how important this barrier was to the deployment of the activities identified in the research.

Indeed, some participants highlighted that it was the delay in accessing finance that presented a barrier, rather than altogether restricted access. Consecutive unsuccessful grant applications were cited by a small number of organisations as a barrier to growth.

4.3.3 Information Failures

A small number of organisations discussed the lack of available data as a barrier to the deployment of activities. This was with particular reference to the exploitation of marine resources. Whilst recognising that some information is available in the public domain (for example via EMODnet[29]), organisations specifically cited the lack of publically available data held by private organisations that could be useful to enable their activity to be located in an effective location as possible. In particular, participants identified the capture of monitoring data, gathered and held by organisations currently operating in the marine environment (e.g. monitoring of offshore wind farms and oil and gas installations) as good examples of datasets that might also be useful for other

[29] http://www.emodnet.eu/

organisations.[30] Many of the participants referred to these issues in a somewhat abstract fashion and it was unclear whether the availability of such data would be useful for developing environmentally-friendly activities specifically.

The Commission is undertaking a number of activities which are focussed on enabling access and lowering costs of primary data collection at an EU level. The Commission Communication on innovation in the Blue Economy proposed a series of actions related to data accessibility. [31] For example, the delivery of a multi-resolution map of the entire seabed of European waters. Furthermore, the Open Research Data Pilot (ORD pilot) under Horizon 2020 aims to improve and maximise access to and re-use of research data generated by Horizon 2020 projects.

4.3.4 Technical Barriers

For a limited number of activities, the technical feasibility of the activity was seen as a barrier and/or issue to growth. In particular, participants undertaking novel activities acknowledged that technical understanding was currently lacking, especially when compared to terrestrial activities. The marine environment is often hostile and for some types of innovative activities (e.g. wave energy), operation in the marine environment is untested on a commercial scale. Thus organisations cited issues surrounding less technical knowhow in the marine environment as a barrier to entry.

Despite these concerns, many of the participants who raised this issue acknowledged that they were successfully able to access suitable research and development funding; aimed at helping to develop better technical understanding. Often these were EU or national funding programmes (e.g. Horizon 2020) that were targeted specifically at improving knowledge within the marine environment.

In addition to research and development funding, some participants, particularly in the Baltic Sea, identified the use of local and regional (sub-national) cluster groups/originations. These aimed to promote the use of collaborative approaches to tackling all types of barriers, but were seen as particularly useful for technical barriers as often a university or research institution was at the centre of the cluster group and able to dedicate research activities to issues identified.

4.3.5 Rules and Regulations

A commonly cited barrier by participants of the workshops and interviews referred to existing rules and regulations preventing or deterring activities from being able to take place. These varied in jurisdiction; with rules cited at a local level, through to those discussed at an EU level highlighted by participants.

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[30] EMODnet has meanwhile launched a data ingestion portal (https://www.emodnet-ingestion.eu/) specifically designed to encourage the submission of such data.

[31] Communication from the Commission - Innovation in the Blue Economy: realising the potential of our seas and oceans for jobs and growth (COM(2014) 254 final/2)

Each instance appeared to be highly specific to the activity, and there was no conformity to the sector from which any particular issues were raised. However, often the rules and regulations has been in place for some time and were not as a result of recent changes in the legislative framework.

In some cases, rules promoting environmental protection were highlighted as a barrier. An example of this was the protection of coastal vegetation in Estonia that prevented it from being used for commercial uses.

A small number of participants outlined a view that the rules and regulations were often inflexible and crudely applied. However, it was unclear in these instances whether the economic activity being promoted could be undertaken sustainably.

In addition to rules and regulations determining whether activities could or could not be undertaken, a small number of participants identified examples of limitations placed on how activities could take place. Such issues included difficulties in obtaining organic status for mussel aquaculture located in close proximity to offshore wind farms. This specific issue was due to the 'industrial' classification of the wind farm funded within the Mermaid Horizon 2020 project. [32] Like many of the barriers identified, these appeared to be anecdotal and did not appear to be representative of wider issues within the economy.

The results of survey also supported the view that regulatory barriers have deterred more environmentally-friendly activities. Of the small number of survey respondents who identified barriers, the vast majority highlighted regulatory barriers as being key. However, limited detail relating to the precise issues was provided in the survey responses. Respondents who did provide detail highlighted a lack of political and regulatory 'will' to enable activities and inconsistencies between regulators approach to their activity (both within Member States and the EU) as key barriers.

4.3.6 Demand-side Barriers

Whilst the majority of issues raised by participants related to the supply of goods and services, a small number of participants also highlighted a number of demand-side issues and barriers that prevented more environmentally-friendly activities from being undertaken. These tended to be raised by participants in more established sectors, where the products and services were more diversified with a variety of options available to consumers.

Examples were highlighted in the fishing industry, with a lack of cultural acceptance of some consumers to purchase certain by-catch. In these instances, participants highlighted that the introduction of discard bans had enabled the sale of a greater diversity of fish stock, but that distributors and retailers had found it difficult to establish a market for such products due to unfamiliarity of the species by consumers. These

[32] See: http://maribe.eu/wp-content/uploads/2016/11/b-6-maribe-mermaid-mussels-final-report.pdf

barriers appeared to be overcome by novel approaches to promoting such goods, such as the distribution of educational material.

5.0 Summary of Key Findings

The research has undertaken an extensive review of environmentally-friendly activities within the marine environment. On the whole, the research has identified a large number of examples of (more) environmentally-friendly activity, but these have tended to occur at a small scale, with very few examples of large scale job creation.

It should also be recognised that the research has encountered a number of limitations in identifying and accessing activities relevant to the scope of the research. The extent to which they have influenced the findings is unclear. It is important, however, that they are acknowledged in the context of interpreting the findings. Some of the key limitations include:

1) The definition of a 'green' activity or 'green job' is not sufficiently defined. This posed problems for the elements of the research using primary research, with some organisations unsure whether their activities would be considered sufficiently 'green' enough. For a small number of organisations, this led to a reluctance to discuss their activity.
2) The research was primarily focused on innovative and niche activities. These tended to identify examples which were not yet commercialised and therefore had limited numbers of jobs associated with their activities.
3) Associated with this issue, the most visible examples were beneficiaries of research and development funding from public institutions. The effect of this might have been to distort the research findings in the favour of these projects, meaning that entirely privately funded R&D was underrepresented.
4) This might also have been the case for successful projects. Those responsible for activities that have not achieved their objectives are less likely to promote or publicise them.
5) Difficulties were encountered when trying to engage with economic actors. One possible reason for this is that the idea of greening the Blue Economy is a relatively new and novel area. Additionally, some stakeholders, particularly in the private sector, may not have felt that there was an incentive to them to participate in the research.

Where environmentally-friendly activities were identified the distribution was not uniform, with the widest range of the examples being focussed in Northern and Western parts of the EU. Examples were also identified in the Southern parts of the EU, however, these tended to be more focussed on a handful of economic sectors that are well established in the region (e.g. coastal tourism).

The coverage of the activities identified in the research includes a wide range of economic sectors, including the majority of those identified as priority areas for the growth in the Blue Economy. The notable exception to this was the mineral resources sector, where no activities were identified.

A range of motivations for undertaking more environmentally-friendly activities were reported by economic actors. A large number of activities were research-based, and

associated with the public sector, universities or research institutions. There was anecdotal evidence to suggest that the commercialisation of new technologies or methods was not always high on the agenda for these projects. Furthermore, there are concerns over the longevity of the jobs created, insofar that they are reliant on financial support.

There was also evidence to suggest that many of the activities undertaken by larger private organisations were associated with a CSR strategy. This may go some way to explaining the attention that 'higher profile' environmental issues – such as emissions of greenhouse gases, or habitat conservation – received.

The research has identified various intrinsic barriers and issues within the marine sectors that currently prevent some of the most innovative activities from becoming mainstream. Participants in the research drew particular attention to those issues and barriers that they felt had impacted the development of their own activities. Accordingly, these were often sector, or activity specific, with few issues identified that affected multiple marine and maritime industries. These issues included various examples of regulatory and market failures that failed to promote more environment friendly activates. Access to finance was an exception to this, with a number of participants citing difficulties in accessing start-up funding. However, as with many of the barriers and issues raised, it appears that this issue did not prevent activities from taking place, rather slowing down the activities progression.

6.0 Recommendations

This research has identified a wide range of innovative activities being undertaken across Europe. There are a number of recommendations that have emerged from this work, which can be categorised according to the following themes.

Definitions and Terminology

For many organisations and individuals involved in the research, the term 'green' jobs was an abstract concept. There was uncertainty as to whether their particular activities would be classified as being environmentally friendly, which might have impacted on their willingness to participate in some aspects of the research.

Looking ahead, it might be beneficial for future research to develop a more accessible definition of 'green' activities. This could be informed by the activities identified as part of this study. Alongside a general definition, it is also recommended that illustrative examples, relevant to individual economic sectors, are provided, along with a forward looking vision statement. Together, this supporting information would give potential participants a clear grasp of the concept.

Engagement with Economic Actors

This research utilised a multi-methods approach. As identified in previous sections, this had mixed success. It was clear that approaches using online methods (including survey and email invites) had limited appeal to many potential participants. One reason for this may have been that many of those identified as part of the research were SME's, with little capacity to engage in research activities.

Accordingly, if future research was to be conducted with a similar group of participants, it is recommended that alternative approaches be used. This might include a greater use of telephone research or, where possible, face-to-face research. Given that many operators in the marine environment are dispersed geographically, telephone research is more likely to be cost-effective. It may also be necessary to incentivise participation. One way of doing this is by offering entry into a prize draw.

Addressing Barriers

The research identified a number of barriers to more environmentally friendly activities. The nature of these barriers are wide-ranging and multi-faceted. Given that many of the participants were actively working on successful activities it is not clear what the overall impact of each of these has been on individual sectors as a whole and whether some are considered to be more impactful than others. Therefore it is recommended that these barriers are investigated further so to ensure that they can be better understood. In the following sub-sections a set of specific recommendations are provided.

Market and Economic Barriers

It is recommended that market and economic barriers are addressed according to the structure of the EU maritime sectors. That is, they are examined and that appropriate solutions are considered at a sector-specific level. At the same time, it is important to

consider the interconnectedness of the Blue Economy, and the extent to which the difference sectors coexist.

This is in consideration of the individual characteristics of each sector. For example, in some sectors activities are led by a small number of larger organisations. The approach to engaging these organisations in more environmental friendly activities is likely to be different to sectors which are comprised of a greater number of smaller businesses.

Availability of Finance

The availability of start-up finance for environmentally friendly activities was identified as an issue by participations from a range of economic sectors. Whilst existing mechanisms, such as Horizon 2020 funding, were being accessed by a number of organisations it appears necessary to consider the use of alternative mechanisms to support these novel activities. Notwithstanding adherence with state-aid guidelines, it is suggested that public sector solutions providing micro-finance might be a suitable form of support.

Information Failures

Access to data and information on the marine environment is essential for both understanding the environmental impacts associated with human activity and enabling some types of environmentally friendly activities. In recognition of this, a number of efforts are already underway (as outlined in Section 4.3.3); such efforts should continue to be supported.

Technical Barriers

For a limited number of activities, the technical feasibility of the activity was seen as a barrier and/or issue to growth. Often economic operators were seeking to address these through research and development activities funded either by public or private finance. Where the objective of research finance is to directly promote economic growth it is recommended that that finance is focussed on organisations that are sufficiently motivated to commercialise the research. Additionally where the intention is to generate intellectual property for the wider scientific and research community, then it is recommended that adequate knowledge dissemination activities should be conducted.

Rules and Regulations

Many of the failures concerning rules and regulations were specific to individual participant's circumstances. It is therefore difficult to identify a recommendation that is able to address these issues together. Therefore it is suggested that these are considered on a case-by-case basis once robust information becomes available to the Commission.

Demand-side Barriers

There appears to be a shortage of demand for some activities providing more environmentally-friendly goods and services. There are a wide range of influences on consumer demand and it is difficult for a single recommendation to be provided that

would address this issue. Accordingly, it is recommended that further research be undertaken to better understand the barriers to demand.

APPENDICES

A.1.0 Results of the Literature Review

Provided as a separate file.

A.2.0 Survey Questionnaire

Question ID	Topic	Eligibility Criteria (where relevant)	Question	Answer Instructions (where multiple choice, assumed 'select one option only' unless stated otherwise)	Response Options
CON1	Contact details		Please provide your personal information below. You are not obliged to provide any personal information, so click next (or 'skip'?) if you would prefer to remain anonymous. We will not contact you without your express permission (we will ask you this at the end of the questionnaire) or share the information you provide with any third parties.		Name: [Insert text] Organisation: [Insert text] Country of residence: [Insert text] E-mail address: [Insert text] Contact number: [Insert text]
ACT1	Actors involved		Please identify the sector that best describes the area in which the initiative operates.	Select all that apply	•Fisheries, aquaculture and related activities •Blue biotechnology •Oil & gas, mining and other non-living resources •Transport and Ports •Shipbuilding •Coastal and maritime tourism •Marine energy •Telecommunications and cables •Desalinisation •Regulation •Other: [Insert text] •Unsure
ACT2	Actors involved	If selected 'Fisheries, aquaculture and related activities' to Question ACT1.	Thank you. Now please identify the sub-sector that best describes the area in which the initiative operates.		fishing, aquaculture, processing, markets
ACT3	Actors involved	If selected 'Oil & gas, mining	Thank you. Please identify the sub-sector that best describes the area in		oil and gas, sand and gravel, salt, minerals

		and other non-living resources' to Question ACT1.	which the initiative operates.		
ACT4	Actors involved	If selected 'Transport and Ports' to Question ACT1.	Thank you. Please identify the sub-sector that best describes the area in which the initiative operates.		passenger and freight shipping, ports, navigational dredging
ACT5	Actors involved	If selected 'Shipbuilding' to Question ACT1.	Thank you. Please identify the sub-sector that best describes the area in which the initiative operates from the list below:		shipbuilding, offshore floating structures and marine equipment
ACT6	Actors involved	If selected 'Coastal and marine tourism' to Question ACT1.	Thank you. Please identify the sub-sector that best describes the area in which the initiative operates.		Coastal tourism, maritime tourism
ACT7	Actors involved	If selected 'Marine energy' to Question ACT1.	Thank you. Please identify the sub-sector that best describes the area in which the initiative operates.		•Tidal/current •Wave •Wind •Marine biomass •Other [Insert text]
ACT8	Actors involved		Please provide the name of the individual or organisation leading the intervention		Open Text
ACT9	Actors involved		Please select the category of organisation that best describes the leading organisation.		•3rd sector organisations / Non-Governmental Organisations •Individuals •Government / Government body •Private sector organisation •Trade Association •University / Research Institution •Other [Insert text] •Unsure
ACT10	Actors involved		We would like to know about any other organisations that are involved. Are there any additional organisation involved in the initiative?		•Yes •No •Unsure
ACT11	Actors involved	If selected 'Yes' to Question ACT10	Please provide the name of any additional organisations involved in the initiative.		Open Text
ACT12	Actors involved	If selected 'Yes'	Please select the category of		•3rd sector organisations / Non-Governmental Organisations

		to Question ACT10	organisation that best describes the additional organisations from the list below:		•Individuals •Government / Government body •Private sector organisation •Trade Association •University / Research Institution •Other [Insert text] •Unsure
ENV1	Environmental Pressure		We would like to know more about the environmental theme that your initiative seeks to address. Please select the theme that is most relevant to your initiative.	Select all that apply	•Substances, litter and energy •Physical •Biological
ENV2	Environmental Pressure	If selected 'Substances, litter and energy' to Question ENV1.	Thank you. Please identify the environmental issue within the 'substances, litter and energy' theme that best describes the issue that your initiative aims to address.	Select all that apply	•Input of nutrients (from diffuse sources, point sources or atmospheric deposition) •Input of organic matter •Input of hazardous substances, e.g. synthetic substances, non-synthetic substances, radionuclides (from diffuse sources, point sources, atmospheric deposition, acute events) •Input of litter (e.g. solid waste matter, including micro-sized litter) •Input of anthropogenic sound (impulsive, continuous) to the marine environment •Input of other forms of energy •Other: [Insert text] •Unsure
ENV3	Environmental Pressure	If selected 'Physical' to Question ENV1.	Thank you. Please identify the environmental issue within the 'physical' theme that best describes the issue that your initiative aims to address.	Select all that apply	•Disturbance or damage to seabed •Extraction of seabed substrate (physical loss) •Change of seabed substrate or morphology (physical loss) •Changes to hydrological conditions •Input of water (point sources) •Extraction of water •Other: [Insert text] •Unsure
ENV4	Environmental Pressure	If selected 'Biological' to Question ENV1.	Thank you. Please identify the environmental issue within the 'biological' theme that best describes the issue that your initiative aims to address.	Select all that apply	•Input or spread of non-indigenous species •Input of microbial pathogens •Input of genetically-modified species and translocation of non-indigenous species •Loss of, or change to, natural habitat by cultivation of animal or plant species •Disturbance of species (where they breed, rest, feed, etc.) due to human presence •Extraction of, or mortality/injury to, wild species, including target and non-target species (by commercial and recreational fishing and other activities) •Other: [Insert text] •Unsure
DES1	Description		Which of the following statements best		•The initiative is in the planning stages

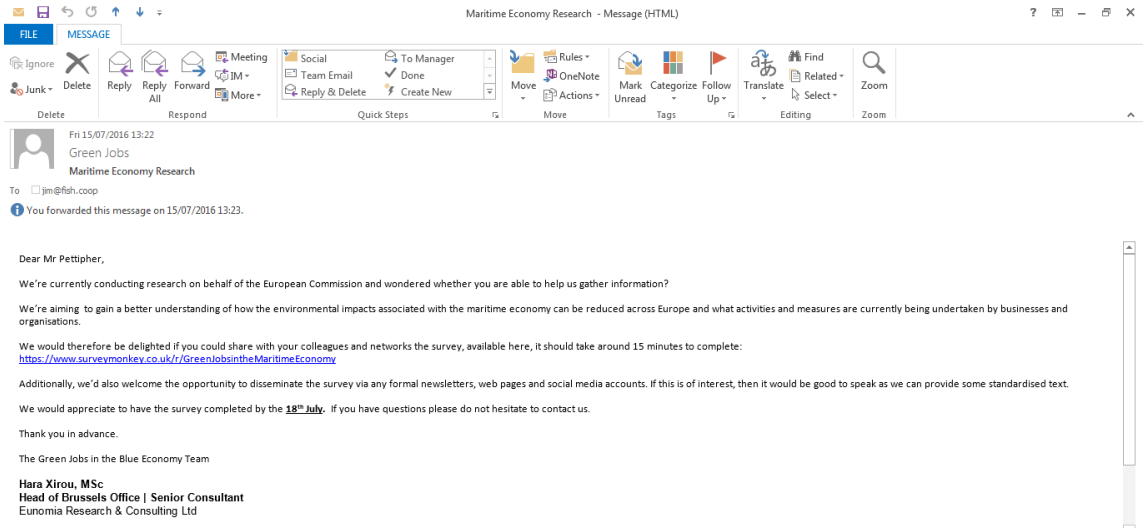
			describes your initiative.		•The initiative is currently up and running •The initiative is no longer up and running •Other: [Insert text] •Unsure
DES2	Description		We would like to know more about the initiative that you are involved with. Please provide a brief description - including any environmental aims and objectives - and whether it is operating successfully. If you are able to do so, please provide a link to an official website or any supporting information.		Open Text
DES3	Description		At what scale does the initiative operate?		•Local (operating within a locally defined area, possibly only at one site) •Regional (operating across a definable region of a Member State) •National (operating across a Member State) •International (operating across more than one Member State) •Unsure
PRO1	Programme Support		Is the initiative supported by EU funding or another form of support?		•Yes •No •Unsure
PRO2	Programme Support	If selected 'Yes' to Question PRO1	Please select the type of support received from the list below.	Select all that apply	•EU - Research & innovation •EU - Structural fund •EU - Grant •EU - Training programme •Other - Research & innovation •Other - Grant / Finance •Other - Training programme •Other - Self-funded •Other: [Insert text] •Unsure
PRO3	Programme Support	If selected 'EU - Research & innovation' to Question PRO2	Please select the programme under which support was received from the list below:		•Horizon 2020 •FP7 •FP6 •Other: [Insert text] •Unsure
PRO4	Programme Support	If selected 'EU - Structural fund' to Question PRO2	Please select the fund under which support was received from the list below:		•European Maritime and Fisheries Fund (EMFF) / European Fisheries Fund (EFF) •European Regional Development Fund (ERDF) •Cohesion Fund (CF) •European Social Fund (ESF) •European Agricultural Fund for Rural Development (EAFRD) •Other: [Insert text] •Unsure

PRO5	Programme Support	If selected 'EU - Grant' to Question PRO2	Please select the grant under which support was received from the list below:		•Life •Life+ •Other: [Insert text] •Unsure
POL1	Policy Instrument		Was any form of economic or regulatory policy instrument used as part of the initiative?	Select all that apply	•Yes - Economic •Yes - Regulatory •No •Other [Insert text] •Unsure
POL2	Policy Instrument	If selected 'Yes - Economic' to Question POL1	Please specify the type of economic instrument used	Select all that apply	•Taxes and fees •Subsidies •Incentives •Tradeable permits
ECON1	Economic information		We are interested in learning more about the opportunities for marine and maritime sustainable growth and job creation. With this in mind, the following questions concern economic information associated with the initiative. Firstly, please use the box below to tell us how many jobs (defined as Full Time Equivalents) are associated with the initiative? Please also provide the reference year for this information.		FTE's: [Open text] Reference year: [Open text] •There are no jobs associated with the initiative •Unsure •Would rather not say
ECON2	Economic information		If possible, please use the text box below to tell us how much turnover was generated for the most recent year data is available.		Turnover (€): [Open text] Reference year: [Open text] •There is no turnover generated from the initiative •Unsure •Would rather not say
REP1	Replication		To what extent do you agree with the statement: 'the initiative I am involved with could be easily replicated in other EU Member States'		•Strongly agree •Agree •Neither agree nor disagree •Disagree •Strongly disagree •Unsure
REP2	Replication		To what extent do you agree with the statement: 'the initiative I am involved with could be easily replicated in other economic sectors'		•Strongly agree •Agree •Neither agree nor disagree •Disagree •Strongly disagree

					•Unsure
REP3	Replication		What is the biggest challenge or hurdle that you have had to overcome to get to this stage?		Open Text •There have been no challenges or hurdles •Unsure
REP4	Replication		Are there any particular challenges or barriers that you think might prevent initiatives similar to this one from becoming more widespread and successful in the EU28? Please provide your answer in the text box below.		[Open Text] •No, I don't think there are any barriers or challenges. •Unsure
REP5	Replication	If an answer is provided to Question REP4.	Do you think there a potential for public authorities to support this kind of activity or to remove barriers, and if so at what administrative level?		[Open Text] •No, I don't think there is any potential for public authorities to remove barriers. •Unsure
REP6	Replication	If responded 'The initiative is in the planning stages' to Question DES1.	Is there a detailed plan outlining the implementation of those initiatives?		•Yes •No
END1	Sign off		This nearly brings us to the end of the survey. Please indicate below whether you would be happy to take part in additional research on this topic.		•Yes, I'd be happy to. •No, please do not contact me with details of any additional research. •Unsure
END2	Sign off		Thank you very much for taking the time to participate in this survey. We'd be grateful for any feedback you might have on the structure and content. Please email any thoughts you might have to Sam Taylor at sam.taylor@eunomia.co.uk		

A.3.0 Survey Recruitment

Figure 6-1: Email Recruitment



Maritime Economy Research - Message (HTML)

FILE MESSAGE

Ignore Junk Delete | Reply Reply All Forward Meeting IM More | Social Team Email Reply & Delete To Manager Done Create New | Move Rules OneNote Actions | Mark Unread Categorize Follow Up | Translate Find Related Select | Zoom

Delete Respond Quick Steps Move Tags Editing Zoom

Fri 15/07/2016 13:22

Green Jobs

Maritime Economy Research

To jim@fish.coop

You forwarded this message on 15/07/2016 13:23.

Dear Mr Pettipher,

We're currently conducting research on behalf of the European Commission and wondered whether you are able to help us gather information?

We're aiming to gain a better understanding of how the environmental impacts associated with the maritime economy can be reduced across Europe and what activities and measures are currently being undertaken by businesses and organisations.

We would therefore be delighted if you could share with your colleagues and networks the survey, available here, it should take around 15 minutes to complete:
https://www.surveymonkey.co.uk/r/GreenJobsintheMaritimeEconomy

Additionally, we'd also welcome the opportunity to disseminate the survey via any formal newsletters, web pages and social media accounts. If this is of interest, then it would be good to speak as we can provide some standardised text.

We would appreciate to have the survey completed by the **18th July**. If you have questions please do not hesitate to contact us.

Thank you in advance.

The Green Jobs in the Blue Economy Team

Hara Xirou, MSc
Head of Brussels Office | Senior Consultant
Eunomia Research & Consulting Ltd

Figure 1-2: Survey Poster

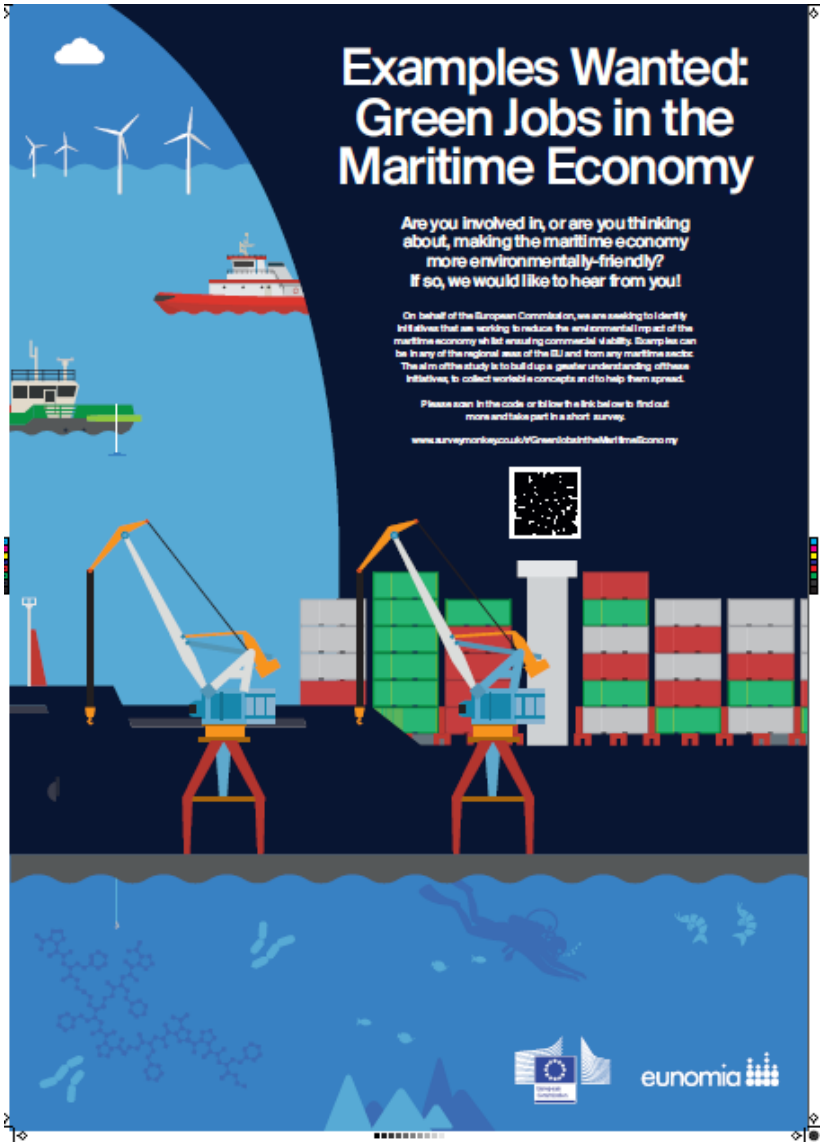


Figure 1-3: Social Media Content Plan

Day	Date	Time	Message	Characters
Wednesday	07/07/2016	14:00:00	Help us assess the environmental impacts of the marine economy by taking & sharing this survey http://bit.ly/29oS5rV #blueeconomy #jobs	135
	07/07/2016	17:00:00	.@The_MMO Help us secure the future of our seas by retweeting & participating in our quick survey http://bit.ly/29oS5rV #blueeconomy	132
Thursday	08/07/2016	09:00:00	Do you work in the maritime industry in the EU? Do you care about the future of our seas? If so, take our survey http://bit.ly/29oS5rV	135
	08/07/2016	12:30:00	We're looking for marine industry reps to complete our quick, but important survey http://bit.ly/29oS5rV please retweet @NaturalEngland	136
Friday	09/07/2016	10:00:00	Please help us assess environmental impacts of marine economy by sharing this survey @BM_Scotland http://bit.ly/29oS5rV #blueeconomy	133
			.@_Retorna @HugoSAS @WhaleFest pls help us assess environmental impact of #blueeconomy by completing/sharing this http://bit.ly/29oS5rV	135
	09/07/2016	15:00:00	.@REEFSproject help us assess environmental impact of #blueeconomy by completing our short survey http://bit.ly/29oS5rV	136
Monday	11/07/2016	09:00:00	We're looking for marine industry reps to complete our quick, bt important survey http://bit.ly/29oS5rV please retweet @DEFRAGovUK #bluemind	140
			.@sascampaigns will you help us assess environmental impact of #blueeconomy by filling in/sharing our quick survey? http://bit.ly/29oS5rV	137
	11/07/2016	14:00:00	.@bluemarine we're assessing environmental impacts of #blueeconomy please help us by completing our quick survey http://bit.ly/29oS5rV	134
Tuesday	12/07/2016	11:00:00	Will you retweet our call for all reps from the Welsh marine industry to complete our quick survey? @WelshGovernment http://bit.ly/29oS5rV	138
			.@projectaware will you help us assess environmental impact of #blueeconomy by filling in/sharing our quick survey? http://bit.ly/29oS5rV	
			.@blackseacommiss please help us assess environmental impacts of the #blueeconomy by taking & sharing this survey http://bit.ly/29oS5rV	136
Wednesday	13/07/2016	16:00:00	.@gtpgr please can you ask marine industry reps who work in your beautiful seas to take our quick survey? http://bit.ly/29oS5rV #blueeconomy	140
			.@2minbeachclean will you help us assess environmental impact of #blueeconomy by filling in/sharing our quick survey? http://bit.ly/29oS5rV	139
Thursday	14/07/2016	12:30:00	.@WWFEurope we're assessing environmental impacts of #blueeconomy please help us by completing our quick survey http://bit.ly/29oS5rV	133
			.@o_merk @mcsuk @CleanCoasts pls help us assess environmental impact of #blueeconomy by completing/sharing this http://bit.ly/29oS5rV	133
Friday	15/07/2016	10:00:00	.@yministeriet @PuhdasItameri please complete our survey to help assess the environmental impacts of the #blueeconomy http://bit.ly/29oS5rV	140
			.@PADI will you help us assess environmental impact of #blueeconomy by filling in/sharing our quick survey? http://bit.ly/29oS5rV	
			.@HELCOMInfo please help us assess environmental impacts of the #blueeconomy by taking & sharing this survey http://bit.ly/29oS5rV	131
				0
Monday	18/07/2016	17:00:00	.@EEFund will you help us find marine industry reps to complete a quick survey? We're assessing the environmental impact of the #blueeconomy	140
			.@osparcomm please help us assess environmental impacts of the #blueeconomy by taking & sharing this survey http://bit.ly/29oS5rV	130
Wednesday	20/07/2016	10:30:00	.@EstonianGovt Help us assess environmental impacts of #blueeconomy by taking & sharing this survey http://bit.ly/29oS5rV	122
	20/07/2016	14:30:00	.@lvjurasad @IEA please complete our quick survey to help us assess the environmental impacts of the #blueeconomy http://bit.ly/29oS5rV	136
Thursday	21/07/2016	09:30:00	.@UNEPinEurope we're assessing environmental impacts of #blueeconomy please help us by completing our quick survey http://bit.ly/29oS5rV	136
	21/07/2016	15:00:00	Will you retweet our call for all reps from the German marine industry to complete our quick survey? @WWF_Deutschland http://bit.ly/29oS5rV	139
Friday	22/07/2016	10:00:00	.@Stenbockimaja please complete our quick survey to help us assess the environmental impacts of the #blueeconomy http://bit.ly/29oS5rV	135
			.@greatnurdler @FIDRAtweets pls help us assess environmental impact of #blueeconomy by completing/sharing this http://bit.ly/29oS5rV	132
				0
Monday	25/07/2016	10:30:00	Help us assess environmental impacts of marine economy by taking & sharing this survey http://bit.ly/29oS5rV #blueeconomy @ICES_ASC	131
Wednesday	26/07/2016	16:30:00	Will you retweet our call for all reps from the Swedish marine industry to complete our quick survey? @WWFSverige http://bit.ly/29oS5rV	135
	27/07/2016	11:00:00	Will you retweet our call for reps from the French marine industry to complete our quick survey? @ecologiEnergie http://bit.ly/29oS5rV	136
Friday	28/07/2016	09:00:00	.@marinebio help us assess environmental impacts of marine economy by taking & sharing this survey http://bit.ly/29oS5rV #blueeconomy	134

A.4.0 Interview Topic Guide

TOPIC GUIDE

GREEN JOBS IN THE BLUE ECONOMY

Questions

INTERVIEW INTRODUCTION

1 *Thank the interviewee for participation*

2 *Introduce yourself and role in the organisation*

3 *Explain the research:*
We have been commissioned by the European Commission to explore the knowledge and experience held by economic actors who are engaged in, or thinking about making the maritime economy more environmentally friendly in a profitable manner, either by introducing innovative products or by changing the way businesses operate in the various maritime sectors

4 *Outline the structure of the interview:*
We have a range of topics in mind that we'd like to speak to you about including:
- About your Organisation
- About your Activity
- Enablers and Barriers
- Future Plans

5 *Explain the timing:*
The interview is expected to last between 20 and 45 minutes

6 *Re-assure the participant:*
Participation is completely voluntary and you do not have to answer any questions you do not want to

7 *Re-assure the participant:*
If you are not sure how to answer a question feel free to say so

8 *Re-assure the participant:*
If I go silent, its not because I'm not interested in your response, just that I'm listening to you

9 *Recording the interview:*
With your permission we would like to record the interview for two reasons: we would like an accurate record of your views and it allows us to listen to what you have to say, rather than writing down notes

10 *Check if there are any questions before we start and ask permission to start recording*

PART A
ABOUT YOUR ORGANISATION

About this section:	**Timing:**
This section is designed to gather an understanding of the organisation and build rapport with the interviewee.	Expected to be 2-5 minutes

A 1 Nature of Business/Organisation

Probe *What is the main product or service you provide?*

Probe *What sector or sub-sector are you in?*

Probe *What geographical locations do you cover?*

A 2 Size of the Business / Organisation

Probe *What is the size of the estimated total workforce?*

Probe *What is the size of the estimated total workforce related to marine activities?*

A 3 Activities currently undertaken in the marine sector

Probe *What type of activities in the marine sector do you undertake?*

PART B

ABOUT YOUR ACTIVITY

About this section:	Timing:
This section is designed to gather an in-depth understanding of the activity, including details about its economic impact	Expected to be 10-20 minutes

B 1 Activity description

Probe *Description of the activity?*

Probe *Where is the activity located?*

Probe *When did the activity start?*

Probe *Who is involved in the activity?*

B 2 Environmental issues addressed

Probe *What environmental issues in the marine environment is this activity expected to impact on?*

Prompt *e.g. reduce marine litter / reduce disturbance of the seabed*

B 3 Economic output associated with the activity

Probe *Number of jobs (FTEs) involved in the activity?*

Probe *Turnover / profit associated with the activity?*

Probe *Did the activity impact of the competitiveness of your organisation?*

Prompt *e.g. enable advantage over competitors / open up new business opportunities*

B 4 Business model utilised

Probe *What type of business model was deployed?*

Prompt *e.g. Special purpose vehicle (SPV) / start-up / existing business/organisation*

B 5 Collaboration with other organisations

Probe *Are there any other organisations involved in the activity?*

Probe *If so, why are they involved?*

Probe *Is there participation expected to continue in the future?*

B 6 Financial support

Probe *Was the activity supported by external finance?*

Prompt *e.g. grant / programme funding?*

Probe *Who provided support?*

Prompt *e.g. EU / national / local*

B 7 Evaluation

Probe *Has the activity been independently evaluated?*

Probe *If so, what was the outcome of the evaluation?*

PART C
ENABLERS AND BARRIERS

About this section:	Timing:
This section is designed to gather an understanding of the drivers and barriers associated with the activity	Expected to be 5-15 minutes

C 1 Motivations for undertaking the activity

Probe *What was the main motivation for undertaking the activity - primarily economic? Primarily environmental? Other?*

Probe *Was there a policy or regulation that encouraged the activity to take place?*

Probe *Was there an economic and social incentive to support the activity?*

Probe *Who are the catalysts (main actors) to drive these initiatives forward?*

C 2 Barriers associated with the activity

Probe *Was there any barriers which slowed or prevented the activity from taking place?*

Prompt *e.g. regulatory / financial / political*

C 3 Removing barriers for the activity

Probe *Is there a potential for public authorities to support this kind of activity or to remove obstacles?*

Probe *At what administrative level would this work best?*

C 4 Failed activities

Probe *Are there any environmentally friendly activities that you have previously attempted but failed (economically)?*

Probe *If so, why did they fail?*

Info *We seek to gain a better understanding of the challenges involved and the barriers identified*

PART D
FUTURE PLANS

About this section:	Timing:
This section is designed to gather an understanding of the future plans of the organisation	Expected to be 2-5 minutes

D 1 Future plans

Probe *What are your future plans for other environmentally friendly activities?*

Probe *What are the key drivers for these plans?*

Probe *Do you have a detailed plan for implementing these activities?*

D 2 Market and commercial environment

Probe *Do you expect and increase/decrease/same level of environmentally friendly activity in the next 5 years?*

Probe *What will drive the change?*

A.5.0 Completed Interviews

Provided as a separate file.

A.6.0 Example Workshop Agenda

Agenda item	Timing (CET)
Registration and lunch	13:00 – 13:30
1. Welcome and introduction **DG Environment, European Commission** **Sam Taylor, Project Director, Eunomia Research & Consulting**	13:30 – 13:50
2. Showcase examples of 'green' activities	13:50 – 14:10
3. What level of 'green' activity is currently occurring in region? **Including discussion of:** - **Types of sectors most active/ types of activities** - **Economic models used** - **Financial support received** **4. What are the primary motivations and drivers for undertaking 'green' activities?** **Including discussion of:** - **Regulatory drivers** - **Corporate drivers** - **Environmental issues addressed**	14:10 – 15:30
5. Coffee break	15:30 – 15:45
6. Moving towards a blue-green economy? **Including discussion of:** - **Identification of barriers and threats to grow the blue-green economy** - **Role of MSFD and multi-national, national, regional and local strategies in building a blue-green economy** **Role of co-operation in building a blue-green economy** **7. Recommendations for growing the blue-green economy** **Open session to discuss national/regional/EU wide solutions, including incentives or instruments.**	15:45 – 16:45
8. Closing remarks	16:45 – 17:00

A.7.0 Analysis of Activities by Environmental Pressure and Sea Basin

	Environmental Pressure	Black Sea	Baltic Sea	Mediterranean Sea	North-East Atlantic Ocean	Total	Percentage
Substances, litter and energy	Input of nutrients - diffuse sources, point sources, atmospheric deposition	1	9	2	28	40	18%
	Input of organic matter	1	0	1	0	2	1%
	Input of hazardous substances (synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, atmospheric deposition, acute events	5	10	5	1	21	9%
	Input of litter (solid waste matter, including micro-sized litter)	0	2	8	9	19	8%
	Input of anthropogenic sound (impulsive, continuous) to the marine environment	0	2	0	1	3	1%
	Input of other forms of energy	0	0	0	4	4	2%
Biological	Input or spread of non-indigenous species	1	0	1	0	2	1%
	Input of microbial pathogens	0	0	0	0	0	0%
	Input of genetically-modified species and translocation of non-indigenous species	1	0	0	1	2	1%
	Loss of, or change to,	0	1	1	1	3	1%

	Environmental Pressure	Black Sea	Baltic Sea	Mediterranean Sea	North-East Atlantic Ocean	Total	Percentage
	natural habitat by cultivation of animal or plant species						
	Disturbance of species (where they breed, rest, feed, etc.) due to human presence	0	4	7	0	11	5%
	Extraction of, or mortality/injury to, wild species, including target and non-target species (by commercial and recreational fishing and other activities)	11	4	5	18	38	17%
Physical	Disturbance or damage to seabed	0	0	4	4	8	4%
	Extraction of seabed substrate (physical loss)	0	0	0	1	1	0%
	Change of seabed substrate or morphology (physical loss)	0	1	1	1	3	1%
	Changes to hydrological conditions	1	0	1	0	2	1%
	Input of water (point sources)	0	1	0	0	1	0%
	Extraction of water	0	0	2	0	2	1%
	Other	1	11	37	17	66	29%
	TOTAL:	**22**	**45**	**75**	**86**	**228**	**100%**