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Planning windmills offshore with respect to shipping

Pictures made by Douwe Visser on trailing suction hopper dredger the “Elbe”

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Preface

As student of the Van Hall Larenstein this report represents my final project in order to obtain my bachelor degree in Integrated Coastal Zone Management. This report was performed under the Combining Sea and Coastal Planning in Europe –project (C-Scope project). In the C-Scope project the Belgian Coordination Centre for Integrated Coastal Zone Management (Coordination Centre) co-operated with the United Kingdom's Dorset Coastal forum on a seamless integrated approach for management and planning within the coastal zone.

I started writing this report in March 2011. For me it was a long journey to come this far, but along the way I learned a lot. The biggest lesson of all is that that you're not alone in the process. In the beginning of the project I forgot in my enthusiasm to keep a short line with my mentors' on school. This led to some stressful moments during meetings we had, but these moments were also big learning points for me. I want to thank Marije Klinefelter-Busstra and François Perreau for their patience but most of all for their good guidance during the process. For four months I could work in Oostende, at the Coordination Centre for Integrated Coastal Zone Management. Being in the middle of the European C-SCoPe-project which focussed on marine spatial planning, this was the place to be. Hannelore Maelfait was my mentor here. Besides here daily work se always had time to help me with questions and to give advice on practical things, such as the preparation of my interviews. The months in Oostende and at the Coordination Centre for Integrated Coastal Zone Management were really pleasant. I would have had a hard time finding information in Belgium if I did not work here. Via the Coordination Centre for Integrated Zone Management I came in contact with Ulrike Vanhessche from the Belgium Coast Guard, who I want to thank for here information on the national planning processes and approaches. I would like to thank Wim van Urk, from the Directoraat Generaal- water, Rob Gerits from Rijkswaterstaat, Dienst Noordzee, Karen Kooi form the Dutch Wind Energy Association and and Ben Scherpenzeel from the Royal Dutch Ship-owners Association who informed me on the Dutch planning processes and approaches. An finally I want to thank Ness Smith who brought me into contact with Susan Kidd from the Crown Estate and David Cantello from ENECO who informed me on the planning processes and approaches in the United Kingdom.

Summary

Through an increasing demand for lower carbon dioxide discharges together with the anticipation of declining fossil fuels reserves, energy production in Europe will consequently be more and more originated from structures that are winning energy from renewable sources. Europe's aim is to generate 20% of its energy production from renewable sources by the year 2020 (Directive of 2009/28/EG[1]). Every European Union (EU)-member state has to contribute to this, therefore a percentage of their energy supply must be generated from renewable energy sources. The development of offshore wind energy is seen as an important measure to realize this aim (www.ryckevelde.be n.d.). Once constructed, most Offshore Wind Farm (OWF)-locations are no go areas for ships that are often sailing outside the international established shipping routes. The smaller type of ships, which are not bounded to international established shipping routes, can make use of shipping routes which are not indicated on maps. These alternative shipping routes are called secondary shipping routes. Guidance on how to define these secondary shipping routes around wind farms during policy making is not defined. This has led to conflict of interests between the policy makers and stakeholders during the policy making process. This report shows the outcomes of the study focusing on the planning methods and techniques which are used in the United Kingdom, Belgium and the Netherlands to delimitate OWF's when taking into account secondary shipping routes. Information on national planning methods and techniques concerning the OWF-planning process formed the basis of the study. This information was structured and outlined according to the integrated approach to manage the coastal zone; Integrated Coastal Zone Management (ICZM) policy-cycle.

The outcomes of the study gives the lessons learned from the three coastal states, mentioned above, concerning their use of planning methods and techniques. These lessons became clear after the comparison of national planning processes with the UNESCO 10 step approach for Marine Spatial Planning (MSP). The study showed that in an ideal planning process, first the secondary shipping routes are located. When the locations of secondary shipping routes are mapped, a second step is to indicate space for the development of OWF's. The Netherland and Belgium implemented a zoning-plan to overcome conflicts of interests between stakeholders concerning the use of marine space. Participative processes where organized here, and gave input to indicate the best OWF-location. The study showed also that during this process, stakeholders could indicate which assessment should be performed. Whit this approach all conflicting situations in the zoning-plan were assessed and discussed so that the incompatibilities of the plan could adapted in early phase of the process. Ultimately the government offers a plan which is well balanced together with all the responsible authorities, governmental departments and non-governmental organisations. The study showed that it is important that the government directs the planning process in order to prevent problems during the implementation of the plan. They should offer also a well-developed legal framework wherein the plan will be enforced. A guiding document, such as UNESCO step by step approach, is in this case a helpful instrument which supports the government during their plan making process.

[1]Directive of 2009/28/EG; on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

Contents

1. Introduction

Through an increasing demand for lower carbon dioxide discharges together with the anticipation of declining fossil fuels reserves, energy production in Europe will consequently be more and more originated from infrastructures which are winning energy from renewable sources. Europe's aim is to generate 20% of its energy production from renewable sources by the year 2020 (Directive of 2009/28/EG[2]). Every European Union (EU)-member state (Appendix 3 shows all abbreviations) has to contribute to this, therefore a percentage of their energy supply must be generated from renewable energy sources. The development of offshore wind energy is seen as an important measure to realize this aim (www.ryckevelde.be n.d.). European climate agreements[3] but also economic reasons are the main drivers for coastal states to establish wind farms offshore their coast. Support for the development of Offshore Wind Farms (OWF's) lies in the general assumption that there is less competition for resources on sea than on land. When looking from the shore to the North Sea, the open space supports this idea, but in reality the situation is different. Once constructed, most OWF locations are no go areas. Fishing, oil drilling, sand mining, tourism and merchant shipping are activities that can be affected by this. The latter is studied in this report.

90 per cent of European external trade is transported by merchant ships (ECSA 2005). Merchant shipping can be divided in to two categories; deep sea shipping and short sea shipping. Deep sea shipping is making journeys from continent to continent and is, especially on the North Sea, constricted by its draught. Therefore it uses routeing-systems which are established by the national government and adopted by the International Maritime Organization (IMO). These routeing-systems are shown on navigational charts (see Appendix 1). Short sea shipping is making shorter journeys, and is not constricted by its draught. This smaller type of vessel is not bounded to routeing-systems and can make use of shipping routes which are not indicated on maps. These alternative shipping routes are called secondary shipping routes (see figure 1).

Figure 1, Shipping traffic on the North Sea (P.Evans. 2010). The red lines indicate annual tracks of merchant shipping. The data has been retrieved from the Voluntary Observing Ships (VOS). Ships voluntarily participate in collecting meteorological data globally, and therefore also report the location of the ship.

[2]Directive of 2009/28/EG; on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

[3]The renewable energy aims are set in the European Climate Plan (Climate Plan (2008) EC).

It is the task of the coastal states government to develop policy in order to delimitate areas for OWF's in their waters. They are setting out the overall direction of the plan to develop the OWF's by describing; what they want to do (aim), why they want to do it (justification), how they want to do it (planning methods and techniques), and when the results are expected (time frame). Each coastal state faces herein different challenges. The size of the marine area, the types of activity, the uses going here, and the legal and institutional arrangements will determine the planning approach used by the coastal state, making each national planning approach unique (MRAG/European Commission. 2008).

The IMO has indicated the user's space for the merchant shipping-sector on maps through the delimitation of routeing-systems. Besides the routeing-systems, there are the so called secondary shipping routes. I went on board on a vessel and experienced how it is to sail through a channel with on both sides OWF's. In our case it was not an obstacle to be restricted to only this channel, but a conversation with a local revealed that the costs for ferry companies can run up to several millions a year. These ferries have to make a detour of several mills every day when besides the existing OWF's the newly planned OWF's will be constructed. This example takes place on the west coast of the United Kingdom, and shows what the effects are on secondary shipping routes which are cut off. Hereby should be taking into account that the effects of the OWF's on secondary shipping routes can cause problems to ferry routes but not necessarily to other forms of short sea shipping. This example forms the bridge to the problem description for this report.

The national government is responsible to locate these secondary shipping routes as part of their planning process before the delimitation of OWF-development areas starts. There is however no international guideline, which shows the best way to map secondary shipping. The EU promotes Marine Spatial Planning (MSP) as key instrument to face such a challenge by making sustainable decisions (European Commission. 2007). But with the absence of an universally agreed definition of MSP, or binding EU-policies to use MSP (Directorate-General for Maritime Aff airs and Fisheries 2008), no proper guidance is offered. Concerning the secondary shipping routes this has led to problems during the implementation of plans in Belgium the Netherlands and the United Kingdom.

The aim of this report is to show which planning, methods and techniques are used Belgium, the Netherlands and the United Kingdom during their search of space for OWF-development when taking into account the secondary shipping routes. Therefore the planning methods and techniques which are used by Belgium, the Netherlands and the United Kingdom were studied and conclusions have been formed on lessons which can be learned for future OWF-development projects.

The main-question for this research is:

Which lessons can be learned from the planning methods and techniques used in the policy of Belgium, the Netherlands and the United Kingdom to delimitate offshore wind farm development areas, considering the secondary shipping routes?

The sub-questions help to answer the main-question are:

1) Which planning methods and techniques are adopted in the national policies of Belgium, the Netherlands and the United Kingdom to manage the development of OWF's?
2) Which planning methods and techniques are used in Belgium, the Netherlands and the United Kingdom to indicate secondary shipping routes, to support of the OWF planning process?
3) Which lessons can be learned to delimitate OWF development areas, taking into account secondary shipping routes?

First this report makes clear which planning methods and techniques are used to delimitate OWF's. The planning methods and techniques to delimitate OWF's taking into account secondary shipping routes are described in the next chapter. Finally this report makes clear which lessons there can be learned about the use of these planning methods and techniques. The methods which were used during the study are given in the next chapter.

2. Method

The methods used to answer the three sub-questions are outlined in this chapter. Each paragraph of this chapter covers one sub-question. Information on the first and the second sub-question was obtained through literature study, by reading national policy documents developed to manage marine or OWF-planning process. These policy documents were derived from policy carrying bodies.

Interviews were held in order to gain additional information on topics which could not be found in the literature. Based on the information from the literature study a question list could be developed. The question list was send before an interview was held so that the consulted persons could prepare answers. The interviews held in Belgium and the Netherlands were face to face. The interviews done with parties in the United Kingdome were done by e-mail.

The use of the UNESCO step by step approach is outlined in the final paragraph. The UNESCO step by step approach was used to compare the used planning processes with the ideal situation for marine spatial planning.

2.1. Planning process

Paragraph 3.1 answers sub-question one. Information on the national planning methods and techniques used during the OWF-planning process is structured and outlined according to the integrated approach to manage the coastal zone; Integrated Coastal Zone Management (ICZM) policy-cycle. The ICZM consists of five phases (see Figure 2). Each phase of the coastal management cycle prescribes several action points which should be used during planning.

Figure 2, The integrated coastal zone management cycle (S.Olsen 1997). For each phase in the ICZM policy-cycle, the planning methods and techniques which are used by the coastal states are outlined.

Essential actions associated with each step of the marine policy cycle (S.Olsen, 1997).

Step 1; Issue identification and assessment

a) Assess the principal environmental, social, and institutional issues and their implications.
b) Identify the major stakeholders and their interests.
c) Invite review and response to the assessment.
d) Select the issues upon which the management initiative will focus its efforts.
e) Define the goals of the management initiative.

Step 2; Preparation of the plan

a) Conduct scientific research targeted at selected management questions.
b) Define the boundaries of the areas to be managed.
c) Document baseline conditions.
d) Conduct a public education program and involve stakeholders in the planning process.
e) Develop the management plan and the institutional framework by which it will be implemented.
f) Create staff and institutional capacity for implementation.
g) Test implementation strategies at a pilot scale.

Step 3; Formal adoption and funding

a) Obtain governmental mandate for a planning and policy formulation process.

b) Obtain formal endorsement of policies/plan and the authorities necessary for their implementation.
c) Obtain the funding required for program implementation.

Step 4; Implementation

a) Modify the objectives and strategies of the program as needed.
b) Introduce appropriate enforcement strategies.
c) Strengthen institutional frameworks and legal authority for management.
d) Implement mechanisms for interagency coordination.
e) Strengthen program staff capacity.
f) Strengthen program administration and management.
a) Utilize transparent decision-making procedures.
b) Catalyze the construction and maintenance of necessary physical infrastructure.
c) Sustain participation of major stakeholder groups.
d) Implement conflict resolution procedures.
e) Maintain the program's priority on the public agenda.
f) Monitor performance and societal/ecosystem trends

Step 5; Evaluation

a) Assess the program's impacts on the management issues being addressed.
b) Adapt the program to its own experience and to changing social and environmental conditions.
c) Conduct external evaluations at major junctures in the program's evolution.

National policy documents were used to get information on how the five steps of the ICZM policy-cycle are completed by the coastal states. Additional information was gained from interviews and articles. For paragraph 3.1.1, the articles in; "*Who rules the coast? Policy processes in Belgian MPAs and beach spatial planning*" (D.Bogaert. 2008) provided key data. However the most information on the use of planning methods and techiques was gained during an interview with Ulrike Vanhessche from the Coast Guard. The questions for this interview focused on the relation between the Belgium shipping and OWF-sector, and how these parties are controlled by the federal government during the planning process. For the Dutch part information was gained from the website "Noordzeeloket". This website contains all the policy documents related to the planning of the OWF's. For paragraph 3.1.2, the "*Integrated Management Plan for the North Sea 2015*", the "*Policy statement on the National Water Plan*" and the "*End report concerning the query for additional OWF-areas under the National Water Plan*" were used. For the United Kingdom part the most information was obtained from the website of the Crown Estate and the Department of Energy and Climate Change (DECC). For paragraph 3.1.3, the guiding document "*Round 3 zone appraisal and planning; A strategic approach to zone design, project identification and consent*", and the second "*Strategic Environmental Assessment*" were used. Additional information was found in the articles; "*The UK offshore wind power programme: A sea-change in UK energy policy?*" (D.Toke 2010), "*Mobilising for marine wind energy in the United Kingdom*" (S. Jay 2011) and "*Tilting at offshore windmills: regulating wind farm development within the renewable energy zone*" (K.N.Scott 2005). These articles gave inside on the points of improvement and the points which already have been improved concerning the planning methods and techniques for OWF-development.

2.2. Identification of secondary shipping routes

Paragraph 3.1 shows the general process related to the planning of OWF's. Paragraph 3.2 focuses on the methods and techniques used during the development and implementation of policies used to map secondary shipping routes. In each case wherein the outcomes in paragraph 3.1 indicate that national plans lead to conflicts with secondary shipping routes, paragraph 3.2 will show the methods and techniques used by the coastal state to solve this conflict. The ICZM policy-cycle helped also in this paragraph to structure the information. Sub-question three shows which lessons there can be learned from these conflicts.

Each sub-paragraph of paragraph 3.2 starts with an outline, describing which step(s) of the ICZM policy-cycle, will be handled and which sources or persons are consulted to gain information on this.

Appendix 4 provides a full overview of the planning processes and the methods and techniques that are used during the process for Belgium, the Netherlands and the United Kingdom. In the flowchart outcomes on sub-question one and two are combined. The flowchart helped to compare the outcomes and to form conclusions.

2.3. Lessons which can be learned

The scope on the use and nature of MSP is not yet clear in Europe. However, first steps to form a common understanding on MSP have been formed by the United Nations Educational, Scientific and Cultural Organization (UNESCO). In 2009 a Marine Spatial Management (MSP)-guide is been handed out by them (C.Ehler and F.Douvere. 2009). Sub-question three has been answered by comparing the information from paragraph 3.1 and 3.2 with the UNESCO 10 step approach for MSP (see Appendix 5 and read the following text box for more information).

The UNESCO approach is accepted by several countries. It is considered to be an important tool for professionals at the international and national levels who want to know more MSP. Step by step it gives a general overview of the planning methods and techniques which should be used during MSP. Because it shows the ideal situation for MSP, which has been accepted by several international and national (governmental) organizations it is used in this report to analyze the planning methods and techniques used by Belgium, the Netherlands and the United Kingdom. The national planning methods and techniques are arranged according to the ICZM policy-cycle and compared with the planning methods and techniques which are outlined under the UNESCO approach for MSP. The comparison shows whether the lack of planning methods and techniques has influenced the origins of the conflicts which have been put forward.

The UNESCO then steps for MSP are outlined in Appendix 5. In Appendix 5 the UNESCO ten steps are placed within the five steps as described in the ICZM policy-cycle. Each step is subdivided in to three tasks which give information on the outputs that should be delivered from each step.

In paragraph 3.4 the outcomes of the comparison between the UNESCO approach for MSP and the national planning processes are showed in a table. This table indicates for each step if the national planning process corresponds, partly corresponds or does not correspond with the planning methods and techniques as described in the MSP-document. From this comparison conclusions can be drawn concerning the lessons which can be learned during the planning OWF's when taking into account secondary shipping routes.

3. Results

In this chapter the answers are given on the three sub-questions. Paragraph 3.1 begins with the planning process as performed by Belgium, the Netherlands and the United Kingdom. Paragraph 3.2 describes the planning methods and techniques used to map secondary shipping routes. Paragraph 3.3 concludes what the differences and the comparisons are between the three coastal states. In Appendix 4 the planning process of each coastal state is showed in a flowchart. This flowchart is based on the informtation of both paragraphs. For each step in the planning process this flowchart shows; who has done what, in what step of the ICZM policy-cycle and what kind of planning method and technique is used. Paragraph 3.4 shows the outcomes of the comparison between the ten step approach and the planning methods and techniques that were used in Belgium, the Netherlands and the United Kingdom. The comparison is included in Appendix 6. The comparison with UNESCO's approach for MSP shows which planning methods and techniques are missing or do not match. The comparison shows also whether the lack of such planning methods and techniques has influenced the origins of the conflicts which have been put forward.

3.1. Planning Process

A total of three sub-paragraphs describe the five steps of the ICZM policy-cycle for each coastal state. Each sub-paragraph starts with an introduction of the situation prior to the planning process. Each step ends with a box which shows if the coastal state has fulfilled the action points that are mentioned under the ICZM policy-cycle. Not all the five steps could be outlined for the coastal states. In each case the evaluation step is missing because information on this could not be found.

3.1.1. Belgium

Belgium has to realize 13% of energy production from renewable energy sources by 2020 (www.mumm.ac.be., (a) .). The first attempt to reach this aim failed. Within the Belgium part of the North Sea, much responsibility was given to the OWF-developers. They were responsible for the process to select a suitable location for the development of OWF's. OWF-developers could indicate an area within the territorial waters and the EEZ. Authority to issue concessions to the construction and exploitation of windmills was realized with the implementation of the Electricity Act of April 29, 1999. The preconditions and procedures to issue concessions were set under the Royal Decree (RD) of December 20, 2000[4]. The federal government did not interfere in this process. They decided on these locations ex-post. Planning was mainly based on scientific information. Social instruments were used, but late in the planning process. Without a lot of resistance, the federal government approved on the locations and provided concession. However, construction could only start after receipt of a valid environmental permit. During the consultation process on the Environmental Impact Assessment (EIA), concerns were raised about the visual impact of the wind mills along the coast. Consequently, the environmental permits were not issued to the OWF-projects, and plans did not pass at that time (D.Bogaert. 2008).

During a second attempt the federal government started with the search for OWF-locations within a widely supported Marine Spatial Plan (MSP). Many years the development of such a plan was urged by several actors (scientific institutions and nature protection organizations). A non-regulatory plan for the North Sea would serve as solution to a period of public discontent with the execution of spatial policies. This plan would become the "Master Plan" for the North Sea.

[4] Royal Decree December 20, 2000; on the preconditions and procedures for granting a concession for building and exploitation of installations for the production of electrician from water flows and or winds in the Belgian part of the North Sea.

Step 1: Issue identification and assessment

In 2003 the federal government started with the development of the "Master Plan". On planning-level the federal minister for the North Sea was the point of contact between the authorities with responsibility on the North Sea due to its role as chairmen of the Task Force North Sea (C.Plasman. 2007). All federal administrations with responsibilities on the North Sea joined this task force. The federal Minister for the North Sea was also the contact person for the Flemish administrations and all other North Sea stakeholders. The link with the Flemish administration is in this case very important because the jurisdiction on the North Sea is divided between the Federation and the Flemish Region. The Flemish Region is responsible for managing near shore activities (landward from the coastal baseline) and therefore an important actor to consult. They perform maintenance to shipping routes and ensure the accessibility towards Belgian ports. Pilotage, placing beacons from and towards harbors, towage activities and search and rescue activities at sea are under their responsibilities (P.Breyne 2007).

To ensure that this plan would be implemented in such a way that it would be accepted by all marine and coastal actors, participatory measures were conducted by the federal Minster for the North Sea. Bilateral negotiations held with sand miners, energy companies, the former Director-General of the Flemish Administration of Waterways and Marine Affairs (AWZ) [5] and fishers gave inside in the best location to delimitate the OWF's.

Scientific information was obtained by various bodies such as the University of Ghent, the Institute for Agricultural and Fisheries Research [6]and the Management Unit of the North Sea Mathematical Models and the Scheldt estuary (MUMM). They provided the scientific basis during the delimitation process. MUMM collaborated with the Research Institute for Nature and Forest, Institute for Agricultural and Fisheries Research, and the Marine Biology Section of Ghent University to complete the necessary expertise. Research was done on hydro geomorphology, underwater noise, hard substratum epifauna, radar detection of seabirds, marine mammals and socio-economic aspect. (Degraer.S. et al. 2010).

After several months of negotiation, under the "Master Plan", an agreement was reached on the location of the OWF-zone. According to Ulrike Vanhessche from the Belgium Coast Guard-structure, this agreement was made during one weekend. During this weekend the outcomes of the bilateral negotiations were presented and further discussed with the stakeholders. With the former Flemish Minister of AWZ it was decided that the OWF-zone would be delimitated outside, and with a safe distance from the international established shipping route (TSS) "Noordhinde" (J.Stubbe 2010).

The concession areas in the OWF-zone are showed in Figure 3. One's construction work starts these areas must be avoided by shipping.

To ensure that the "Master Plan" stayed on track the federal board of councils agreed on action points for the North Sea. The person responsible for coordinating the execution of these action points was the federal Minster for the North Sea (D.Bogaert. 2008).

Both the development of wind energy, and sand extraction activities were issues to be addressed in the "Master Plan". These activities would be concentrated in zones. For future and current activities, the objectives for various sectors were translated into one MSP. In this MSP each stakeholder had to hand in a part of its working area in favour of the sand extraction and OWF-zones.

[5]Since 1 April 2006, the Waterways and Marine Affairs Administration (AWZ) does not exist anymore. Its tasks are taken over by the:- Department of Transport and Public Works, - Agency for Maritime Services and Coast,- The SA Marine, - Waterways and Sea SA (www.vliz.be).

[6]The Institute for Agricultural and Fisheries Research (ILVO) is a Flemish Scientific Institute. As such, it belongs to the Flemish government's Agriculture and Fisheries Policy Area (www.ilvo.vlaanderen.be).

All this was organized with respect to a sustainable use of the marine environment as far as possible (C.Humblet 2009).

Step 2: Preparation of the plan

In the "Master Plan for the North Sea" the federal government considered the delimitation of two zones; one for sand extraction activities and one for the development of OWF's. The locations of these zones were determined based on information coming from the bilateral consultations (organized by the federal minister for the North Sea), the federal regulator of the electricity and gas market in Belgium (the Commission for the Regulation of Electricity and Gas (CREG)) and the MUMM. The baseline conditions concerning the marine environment were set by MUMM. The federal Minister for the North Sea was established to manage the process towards implementation of the plan.

Step 3: Formal adoption

In March 2004 CREG received the draft version of the proposal concerning the delimitation of the Belgian OWF-zone from the former minister of Economy, Energy, Foreign Trades and Scientific policy. CREG was requested to give an advice on this proposal. CREG based its advice on the existing legal frameworks, information concerning the location of cables and pipes on the sea bottom and by using their own insights and views.

In May 17, 2004[7] the federal government together with the stakeholders decided on the delimitation of one OWF-zone (of 200 m3) offshore the Belgian coast (Figure 3). It is only within this zone that developers may apply for a domain concession.

Authority to implement the Belgian OWF-zone was arranged by way of modifying existing Acts and Royal Decrees. The Belgian OWF-zone was implemented under the Royal Decree of May, 17, 2004 amending the Royal Decree RD of December 20, 2000. According to this Royal Decree OWF-developers are obligated to obtain a domain concession and an environmental permit.

Figure 3, The OWF-concession zones in the Belgian OWF-zone (A.Michaux 2009-2010).

[7] Royal Decree of May, 17, 2004 amending the Royal Decree of December 20 ,2000 on the conditions and procedure applicable for granting a domain concession for the construction and operation of installations producing electricity from water, currents or winds, in the sea areas where Belgium jurisdiction may be exercised in accordance with international law.

Step 4: Implementation
The OWF-developers must submit their request for the domain concession to CREG. CREG will research the application and submits its advice to the federal Minister of Energy who will grant the concession (www.creg.be.(a) .). The domain concession will be issued, based on the Act of June 13, 1969 concerning the exploration and exploitation of non-living resources of the territorial sea and continental shelf.

The environmental permitting procedure is included in the Marine protection Act of January 20, 1999. This acts sets law to protect the marine environment in marine areas under Belgian jurisdiction. This Act requires that OWF-developer must submit an environmental permit, consisting of an Environmental Impact Study to MUMM.

MUMM evaluates[8] this Environmental Impact Study against their monitoring program to ensure a proper evaluation and control on environmental impacts. On each part that not meets the requirements, MUMM can ask the developer to perform additional assessments. Based on the evaluation of the Environmental Impact Study, MUMM will create the Environmental Impact Assessment (EIA) (read the following text box for more information).

MUMM will submit the EIA to the federal Minister responsible for the marine environment who will grant the environmental permit (www.economie.fgov.be/nl .). Currently, five OWF-developers have received the required permits to start building the OWF's. Incompatibilities between secondary shipping routes and OWF's became clear at the moment construction works of the windmills started which leaded to the revision of the plan. This is outlined in paragraph 3.2.1.

[8] Royal decree of September 17, 2003; concerning the procedure of permit and authorization of certain activities in the marine areas under jurisdiction of Belgium.

Step 5: Evaluation
The Marine Spatial Plan as developed under the “Master Plan” is not yet subjected to an evaluation process.

3.1.2. Netherlands

The first tender round for the construction of OWF's in the Dutch part of the North Sea was successful. The construction of two OWF's was finalized in 2007/2008, but more had to be build in order to fulfill the EU-aim which stated that by 2020, 14% of the Dutch energy supply should come from renewable energy sources. According to the Energy report 2008, an installed windmill capacity of 6000 megawatt must be constructed on sea (Ministerie van Economische Zaken., Energierapport 2008 2008). New permits were issued for OWF-projects under a second tender round to realize this aim.

In 2006 the Ministry of Economic Affairs introduced the permitting procedure for new OWF-projects under the so called "second tender round for wind energy on sea". Permits were granted under the Public Works (Management of Engineering Structures) Act[9] by the former Ministry of Transport, Public Works and Water Management[10]. Under this Act the "first comes first served-system" was introduced meaning that the applicant who first completes and submits both the EIA and the permit application to the service office of the Directorate-General (DG)for Public Works and Water Management[11] would be the first, eligible to receive the exclusive right for building an OWF (www.Royalhaskoning.com).

Provisions concerning marine spatial matters were provided under the Fifth National Policy Document on Spatial Planning[12], which was implemented by the former Ministry of Housing, Spatial Planning and the Environment (VROM), on February 27, 2006. In this document the future Dutch spatial plan is set out until 2020. Every 10 years the plan will be revised (M.Hajer and W.Zonneveld. 2000). The spatial planning Act of 2006[13], amending the Act of 1965, provided mechanisms for the implementation of the Fifth National Policy Document on Spatial Planning. The North Sea paragraph of this document introduced a zoning plan to manage marine activities. For OWF-project this meant that construction was excluded within the territorial waters, in favor of fishing, recreational and sand exploitation activities. The safety zones around cables and pipelines, oil and gas drilling platforms and routeing-systems were also excluded for the construction of OWF's. This policy was elaborated in the Integrated Management Plan for the North Sea 2015 (IMPN 2015)[14].

The permitting regime, and the spatial regime, leaded to 78 applications. These applications were submitted to the service office of DG-for Public Works and Water Management by six OWF-developing companies, requesting for 48 unique OWF-locations (S.Zeelenberg 2006). Due to the amount of submitted applications the service office has been closed until every application is assessed. Eventually 12 OWF-projects received the necessary permits from the former Ministry of Transport, Public Works and Water Management (Project team Policy Note North Sea. 2011).

The representatives of the Ministries with responsibility on the North Sea came together under the inter-ministerial body for the North Sea (IDON). They decided that future OWF-projects, which would be permitted under a third OWF-development round, should be bounded to certain areas. The delimitation of suitable OWF-development areas formed one part of a new approach to marine spatial management which would be housed in one integral plan for water management; the National Water Plan (NWP) (V&W 2009).

[9] Wet beheer rijkswaterstaat-werken (Wbr)
[10] Verkeer en Waterstaat (V&W)
[11] Rijkswaterstaat
[12] Nota Ruimte, *Ruimte voor ontwikkeling*
[13] Wet Ruimtelijke Ordening 2006 (WRO 2006)
[14] Integraal Beheerplan Noordzee 2015 (IBN 2015)

Step1: Issue identification and assessment
The NWP was drawn up in cooperation between IDON, DG- for Public Works and Water management and the Ministry of Infrastructure and environment (I & M), the Ministry of Economic Affairs, Agriculture and Innovation (EL & I) and Defense. IDON's project-team started a search to indicate the most suitable areas for OWF-development. The project team of IDON began with bilateral consultations in order to form a complete picture of all interests on the North Sea (Project team Policy Note North Sea. 2011).

The studies were partially outsourced and performed by scientific institutes, advisory board's governmental and non-governmental organizations. Royal Haskoning was responsible for the identification of potential sand extraction sites; Alterra together with the government conducted a study which resulted in to the indication of areas of high ecological value. An expert group identified suitable sea areas for OWF's with respect to shipping. This expert group was led by Danish North VERITAS and worked together with the government, the shipping and the energy-sector. Danish North VERITAS had already done comparable studies for OWF-projects in Denmark. (Project team Policy Note North Sea. 2011).

From previous OWF-development initiative (the second OWF-development round) it was learned that more attention had to be paid on the interests of other sectors during the pre-planning process in order to prevent conflicts. The wind energy-sector, oil and gas-sector, shipping industry, fishing industry, port industry and nature and environmental organizations were consulted (V&W. 2010).

In agreement with the shipping-sector the distance between the OWF-search areas and routeing-systems were determined. According to the shipping-sector, a 2 mile safety zone between OWF-search areas and routeing-systems would be safe (V&W. VROM. LNV. 2009). This decision was however not supported by the wind energy-sector. The Dutch Wind Energy Association (NWEA) stated that such a large safety zone would have significant repercussions because with this, large areas near the coast would be closed for future OWF-development (www.nwea.nl 2009). Nevertheless, this measure remained in force during the planning process.

Step2: Preparation of the plan
After consideration of all other marine aspects, studies were performed to look for the most suitable OWF-development areas. These studies resulted in the indication of two search areas (Borselle and Ijmuiden) which would be suitable locations for the delimitation of OWF's (see Figure 4). However, the planning process showed also that more marine space should be made available in order to reach the energy target.

Due to the obligation to implement safety zones around OWF's locations, fewer windmills can be placed within the two indicated search areas. In order to provide extra space it was decided by the government that two additional search areas should be delimitated (see figure 4). The search area above the "Frisian Isles" and the search area "Offshore the Coast of Holland" make the net available area for OWF development significantly larger. This gave the government enough certainty that a capacity of 6000 megawatt wind energy could be constructed by 2020.

Figure 4,Number 1 shows the search area "Borselle", Number 2 shows the search area "IJmuiden", Number 3 shows the search area "For the coast of Holland" Number 4 shows the search area "above the Frisian Isles", (Project team Policy Note North Sea., 2011)

There was one problem, the additional search area "offshore the coast of Holland" was already filled up with the 12 OWF-projects, permitted under the second leasing round. The location of these projects had led to large conflicts with other uses. Being aware of these tensions, the government decided that studies concerning the delimitation OWF's, in these additional search areas, should be done on a participative way. All users of the North Sea should be considered. Results from this participative process had to rule out the incompatible interests for space. Several aspects were accounted during this participative process;
- already granted permits for OWF's,
-possible changes in shipping routes and safety zones,
-locations of sand extraction sites,
-present and future locations for gas and oil
-and new Natura 2000 sites.

The participative process is described in paragraph 3.2.2.

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Step 3: Formal adoption
The draft-NWP was adopted on 12 December 2008 by the Ministerial Council. The plans and programmes of the NWP were assessed by Royal Haskoning in a Strategic Environmental Impact Assessment (SEA) (V&W. 2010). The NWP and the SEA were laid down together for consultation. This was done in the period between May 11, and June 22, 2009 (V&W 2009) (read the following text box for more information).

The NWP is compiled for the plan period 2009-2015. Policy choices and changes relevant for the North Sea are further outlined in a policy statement concerning the North Sea[15]. The North Sea policy statement provides further substantiation and elaboration of the policy choices in the NWP. The policy statement is an integral part of the NWP, but can be read as a standalone document.

Step 4: Implementation
In December 2009 the government implemented the NWP. The NWP is now a formal governmental plan for all national water related policies, including the North Sea. The NWP is drawn up based on the Water Act that went into force on 22 December 2009. Based on the Spatial Planning Act, the National Water Plan has the status of a structural vision in terms of spatial planning aspects. The government must therefore make spatial decision according to the NWP.

The NWP replaces parts of policy concerning the North Sea which is adopted under the Fifth National Policy Document on Spatial Planning (further elaborated under the IMPN 2015) because it fell behind in terms of content to be efficient and usable for current developments. (V&W 2009).

The implementation of the NWP has not leaded to the permitting of new OWF-projects in the search areas as adopted under the NWP. The Dutch government has analyzed non-spatial aspects such as the permitting a subsidizing of OWF-projects under a third round. The outcome of this analysis has not led to a new permitting-strategy (Interdepartmentale werkgroep 2009).

Step 5
The policy for the North Sea is evaluated ones each 10 years.

[15] Beleidsnota Noordzee.

3.1.3. United Kingdom

Through an increasing demand for lower carbon dioxide discharges and in the anticipation on declining fossil fuels reserves, the United Kingdom is indicating large marine areas for the development of OWF's. By 2020, 15 % of the United Kingdom energy requirements will be produced by sustainable energy sources. This is stated in the policy document "Future offshore: A Strategic Framework for the offshore Wind industry".

United Kingdoms-government uses a lot of its resources to ensure that wind projects continue. This can be inferred from the fact that, since 2008 the Department of Energy and Climate Change (DECC) consisting of a unit which coordinates government efforts to implement renewables policies. The new energy minister of DECC has sought to push the direction of more control from the centre in favour of renewable energies. The development of offshore wind is herein an important factor (D.Toke 2010).

Two OWF-leasing rounds are finished now. During the first OWF-leasing round, developers could only indicate their preferred construction locations within United Kingdom's territorial waters (S. Jay 2011). The second OWF -leasing round extended outside the territorial waters. To make OWF development possible here the government first had to establish its rights under UNCLOS (see Appendix 2) (K.N.Scott 2005). Regulations for this were implementation under the Energy Act of 2004[16]. With this Act, the Renewable Energy Zone (REZ) [17] was delimitated. This zone extends up to 200 nautical miles from the baseline of the territorial sea (S. Jay 2011) which enlarged the potency for future OWF-projects. The lessons learned from the second OWF-leasing round was that OWF-development progressed relatively slow, not only because of consenting and planning issues but also because of supply chain and construction delays (S. Jay 2011).In order to reach the renewable energy targets by 2020, a different, more strategic development approach had to be adopted for future OWF-permitting. The Crown Estate decided therefore to identify OWF-zones which its own strategic planning system (Crown Estate 2010) (read the following text box for more information).

Step 1: Issue identification and assessment

In order to indicate the OWF-zones, a first step was taken by characterizing these zones. The marine spatial management team of the Crown Estate assisted in this. They performed a spatial assessment by using a database with maps wherein several resources of the marine environment are categorized. The Marine Resource System (MaRS) was used to compare this data and to identify OWF-zones with the most development potential and least risks to other uses. Nine zones were identified by the Crown Estate (www.thecrownestate.co.uk (b)., n.d.).

[16] On 22 July 2004 the Energy act 2004 received Royal Assent

[17] The REZ was declared under section 84 of the Energy Act 2004.

These zones were subjected to a Strategic Environmental Assessment (SEA)[18] which considered the environmental implications of the plan. The draft-SEA was laid down for consultation. The reactions on the SEA were brought together under the Post Public Consultation Report.

Step 2: Preparation of the plan
Elements of this step are performed during the implementation phase of the ICZM policy-cycle, step 4.

Step 3: Formal adoption
In January 2009, DECC completed the SEA. According to Susan Kidd from the Crown Estate, from both the SEA and MaRS assessments it was clear that the nine zones represent suitable 'areas of opportunity' for OWF-projects, and have the ability to deliver the required capacity of offshore wind.

The zones are not designed to be totally filled up with windmills. All nine OWF-zones are oversized with the intention to give more control to the developers. Because the zone boundaries cover some areas which will conflict with other uses, the developers have the ability to consider the zone as a whole and to plan their activity within it.

To help the OWF-developers during their planning process, the Crown Estate has developed a non-regulatory strategic approach (Crown Estate (c). 2010). This strategic approach is called; the Zone Appraisal and Planning (ZAP)-strategy (read the following text box for more information).

[18] The SEA Regulations are outlined in the Environmental Assessment of Plans and Programmes Regulations 2004.

Under the ZAP-strategy the developer runs the pre-application procedure of its project. Ones the zone appraisal and plans are finished, an application can be submitted to the Crown Estate. The Crown Estate will issue the first lease. Information gathered under the ZAP can be used later on, when performing the (environmental) assessments, necessary to request for a full lease *(Crown Estate, 2010*).

Step 4: Implementation

In June 2008, The Crown Estate started with the third OWF-leasing round. In order to indicate an OWF construction site within the zone, a first step is taken by characterizing and mapping constrains within the zone. In order to do this the OWF-developer works according the strategy as outlined in the ZAP-document (Crown Estate 2010).

Concerning the implementation of the third OWF-round, Russell Goudbary[19] from the Marine Management Organisation, a delegated statutory body that will undertake marine planning in England according to the Coastal Access Act 2009, indicated that the shipping-sector and the OWF-developers are classing with each other. The shipping industry does not agree with the current development process of new OWF's.The Chamber of Shipping, a non-governmental organization representing the shipping-sector, states that shipping was not taken into account or consulted until after the sites have been designed. In an article published on August 23, 2010 they state: "During assessment the focus is mainly laid down on environmental and economic impact, and not on maritime safety" so a spokesman said. "By this time, a substantial sum of money has already been spent by the developers on economic and environmental assessments, making them naturally defensive of the proposed sites and not receptive to suggestions that the sites are unsuitable because of concerns over maritime safety or negative economic impact on shipping and other industries" (www.british-shipping.org n.d.).

OWF-developers are held responsible to establish stakeholder engagement as early as possible (Crown Estate (c). 2010). For shipping matters the developers can consult the MCA. The MCA is consulted on various matters during the planning process. However, the MCA will only provide guidance on the suitability and sufficiency of the methodology being used to assess the risks. Data such as traffic surveys are not provided by them. Therefore the OWF-developers can consult the maritime data website (MaritimeData.co.United Kingdom). The Marine Management Organization is developing a more integrated approach of planning in UK-waters which could be the solution concerning future problems. Further measures undertaken by the government to ensure that the shipping-sector is accounted during the process is outlined under paragraph 3.2.3.

In 2010 the Crown Estate signed Zone Development Agreements (ZDA) with nine OWF-developers. These OWF-developers had been chosen after an extensive competitive bidding and negotiation process. The ZDA includes the terms on which the OWF-location will be identified and the projects will be developed in the zone. The Crown Estate has a share of 50 % in their OWF-projects.

[19] Russell Goudbary from the Marine Management Organisation was consulted during a workshop organised by C-Scope.

After obtaining the development lease from the Crown Estate the OWF-developers start with the process to obtain a full-lease. To ensure that a proper observation is made on the effects on the marine environment, the Marine Coastal Access Act 2009 has at a section to the Planning Act 2008 which deems that developers should apply for a marine license as part of the consent (Royal Haskoning 2010) (read the following text box for more information).

To obtain a marine license the OWF-developer must complete the EIA-process. The Infrastructure Planning Commission will give advice on the performance of the EIA (read the following text box for more information).

The EIA-process leads to the development of the Environmental Statement. The Environmental Statement is the report documenting the findings of the EIA for the proposed OWF project (*E.Gibson, 2010*), (*Talisman Energy, 2004*). Developers are obligated to prepare the Environmental Statement in accordance with the Infrastructure Planning Environmental Impact Assessment Regulations 2009 (the EIA Regulations).A required part of the Environmental Statement is the Navigation Risk Assessment (MCA. 2005). It is the purpose of the Navigational Risk Assessment to demonstrate to the MCA that the hindrance to shipping routes does not increase the risk to an intolerable level. Rerouting requires national endorsement and international agreements (from the IMO) and, if taken forward, could take between eighteen months and several years. Therefore the MCA is committed to engaging with developers at earliest opportunity to offer advice, where possible, on potential locations and mitigation options for OWF's (D.Toke 2010).
The Navigational Risk Assessment should be performed in accordance with MCA's Methodology for Assessing the Marine Navigational Safety Risks of OWF's. In this document the MCA states that risks to shipping would be verry low at a minimum distance of 5 nautical mile (MCA. 2005).To asses the implications to shipping the document prescribes a number of techniques to assess the risk for navigation.

The use of the Formal Safety Assessment is a required part of the Navigational Risk Assessment because the government included section 99 in the Energy Act 2004[20] which prohibits the granting of a lease to OWF-projects which interfere with recognized sea-routes important for international navigation. It is however a fact that routes will almost undoubtedly be "hindered" (D.Toke 2010).

[20] Which inserted section 36B (1) into the 1989 Electricity Act.

Therefore the OWF-developer must indicate:

- Potential impacts in terms of re-routing and,
- Asses the risks of collisions between vessels and vessels and wind turbines (MCA. 2005).

The consent application must be submitted to the Infrastructure Planning Commission. When the consent application is accepted by the Infrastructure Planning Commission the Crown Estate has the authority, as determined under the Electricity Act 2004, to can grant the full lease to the developer (E.Gibson 2010).

One of the developers who received a ZDA is ENECO, a Dutch energy company with experience on OWF development. They received approval to plan an OWF in the zone which is located in the coastal area between east Devon and Dorset (see figure 8). (www.dorsetforyou.com .). The Solent strait separates the Isle of Wight from the mainland of England and is a major shipping route for passengers, freight and military vessels. It forms the entrance to Southampton port, the second largest container terminal of the United Kingdom. There are no IMO routeing-systems leading to this port.

ENECO's application for the ZDA, contained AIS-data which was obtained over two separate fortnights. This data was used to assess shipping activity in the zone. The areas with high shipping densities are omitted in their decision; where to locate the OWF-development area (see figure 7 and 8).

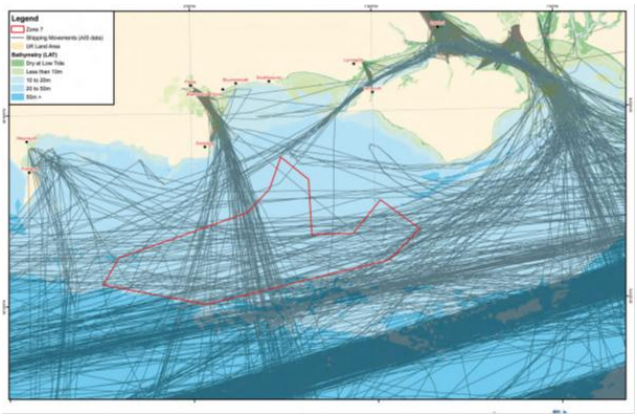

Figure 7, AIS-data showing shipping routes (files.opendebate.co.uk .)

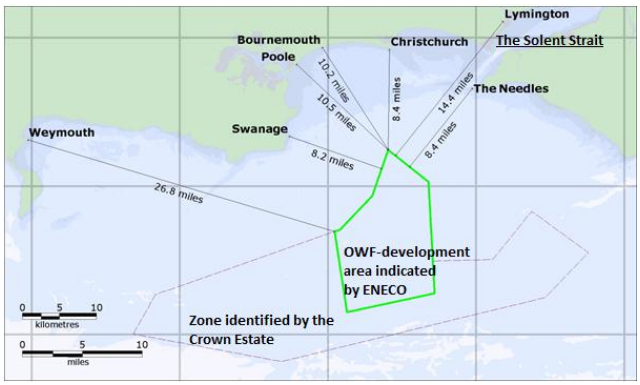

Figure 8, the dashed line shows the zone as indicated by the Crown Estate. The green line shows the locations where ENECO will construct its wind farm (files.opendebate.co.uk .).

ENECO appointed Anatec to perform the risk assessment (www.rya.org.uk 2012). In 2013 ENECO will submit its planning application to the Infrastructure Planning Commission. After exploring the zone, ENECO has indicated a construction area.

Step 5: Evaluation
The development process under the third OWF leasing round is still running and not yet evaluated.

3.1.4. Chapter summary

This paragraph the results found under sub-question one, per step in the ICZM policy-cycle.

Step 1

In Belgium the Netherlands and the United Kingdom, OWF-development will be located in predefined zones. The coastal states delimitated these zone in order to speed up the permitting process or to overcome conflicts with other users.

When looking to the planning process of the coastal states two levels can be identified, the first concerning planning and the second concerning the OWF-project. The Netherlands and Belgium government have made a lot of spatial decisions on planning-level. The planning-level describes the first three steps of the ICZM policy-cycle. The delimitated zones and search areas provide just enough space to ensure that the energy production capacity will be reached. The OWF-developers have less freedom to make their own planning decisions on project-level. The project-level describes the last two steps of the ICZM policy-cycle.

The OWF-zones in the United Kingdom are leased by the Crown Estate. According to Susan Kidd of the Crown Estate, such leasing does not have any meaning in planning law and should not be confused with planning zones as used in the Netherlands and Belgium. These countries are focusing more on the spatial dimension of integrated management. The United Kingdom has chosen to oversize their zones with the intention to give more control to the developers on project-level. The United Kingdom can afford such an approach because they have enough marine space.

Step 2

Stakeholder engagement was arranged by Belgium and the Netherlands on planning-level. In Belgium the location of the OWF-zone was decided after the former Minister for the North Sea had consulted all marine users. In the Netherlands, the Director General (DG)-Water was the initiator of the planning process, and led the project-team of IDON in their search for OWF-development areas. IDON's project-team organized bilateral consultations with all the stakeholders on the North Sea. The United Kingdom did not arrange stakeholder engagement on planning-level. Concerning the location of OWF-zones, the United Kingdom based its decision on scientific studies.

Concerning the delimitation of the OWF-zone the former Belgium federal Minister responsible for the North Sea based its decisions on agreements with stakeholders. In the Netherlands, decisions were based on both scientific studies and stakeholder's involvement.

Step 3

Different authorization structures apply to the coastal states. In Belgium the federal Minister for the North Sea was responsible the development of the Marine Spatial Plan (MSP) on a non-regulatory basis. The outcomes of the MSP are placed under law, but on a sectorial base. The coordinates for the OWF-zone was adopted by Royal Decree, under the Electricity Act of 1999.

In the Netherlands the Ministry of Infrastructure and Milieu (I & M) gave the assignment to prepare the National Water Plan (NWP). The NWP forms an integrated basis to arrange authority to develop water related plans. For the North Sea it includes policy to delimitate search areas wherein future OWF-projects can be developed. Through the implementation of the integrated Water Act of 2009, Ministries are legally bound to make spatial decisions according to the NWP. Enforceability for the delimitation of OWF-areas was derived from the Spatial Planning Act 1965.

In order to plan OWF's in United Kingdoms-waters the Crown Estate and DECC have worked close together. Nine OWF-zones were indicated by the Crown Estate. DECC assessed the environmental implications of the plan by performing a SEA and approved on the zones. There are no legal provisions made to ensure compliance with the identified OWF-zones. The indicated zones indicate areas which will be leased by the Crown Estate. In a non-regulatory document the Crown Estate describes the strategy that should be used by the OWF-developer in order to develop their project proposal. The developer indicates where the OWF-project will be developed in the zone.

Step 4
The implementation of the NWP leaded in the Netherlands to the delimitation of the search areas Borselle and Ijmuiden. In Belgium the OWF-zone was implemented under the Royal Decree of May, 17, 2004. The OWF-zones in the United Kingdom were not implemented on a legal basis. The Crown Estate developed a non-regulatory document that could be used by OWF-developers in order to prepare their application.

Belgium and the United Kingdom have almost the same regime to permit OWF-projects.
- The OWF-developers must bid for a location within the OWF-zone to develop their projects,
- The application for the environmental permit must be submitted to a governmental service body,
- This body will evaluate the application and the Environmental Impact Study.

In Belgium, the MUMM evaluates the application and the Environmental Impact Study. MUMM performs the Environmental Impact Assessment (EIA), based on the Environmental Impact Study, and submits its findings to the Minister responsible for the marine environment. In the United Kingdom the Infrastructure Planning Commission will give advice during the EIA-process. Ones the EIA-process is completed, Environmental Statement can be submitted to the Infrastructure Planning Commission for approval.

The Netherland has assessed several options to implement a permitting regime. This leaded not the implementation of a new permitting regime for the third OWF-development round. The absence of the desired permitting regime can be attributed to the fact that the current national Government does not support the green revelation on sea. Their view is that the construction of OWF's is much too expensive, and it is not worth subsidizing, whilst these OWF projects heavily depend on these subsidies (www.elsevier.nl 2010).

In the Netherlands the participative process to delimitate additional search areas has eventually leaded to the reboot of three OWF-projects. The Dutch government had made money available to subsidize three OWF's which were already permitted under the second OWF-development round. (www.rijksoverheid.nl 2012).

Step 5
The national planning strategy as implemented by the Netherlands has been developed for a time span of five years. After these five years the NWP will be evaluated and revised where necessary. No information has been found on the evaluation of the plans in Belgium or the United Kingdom.

3.2. Identification of secondary shipping routes

This paragraph should be read as completion to paragraph 3.1. A total of three sub-paragraphs describe the planning methods and techniques developed by the three coastal states to map secondary shipping routes.

3.2.1. Belgium

Paragraph 3.1.1 indicated that during the implementation phase of the "Master Plan", the OWF-plans had to be revised. This paragraph describes which decisions and assessments are undertaken to overcome incompatibilities between secondary shipping routes and OWF's. The website of the Management Unit of the North Sea Mathematical Models and the Scheldt estuary (MUMM) provided information on the decisions which are made by the Belgium federal government and the developers in relation on the location of OWF's within the OWF-zone. The Environmental Impact Evaluations performed MUMM gave a complete picture which decisions are made when locating the OWF's in relation to the secondary shipping routes. A second interview with Ulrike Vanhessche answered the questions which arosse when reading this Environmental Impact Assessments.

Step 4: Implementation

During the permitting process, the OWF-developers performed risk assessments to identify the secondary shipping routes in and around their project areas as part of the Environmental Impact Study [21]. Each OWF-developer consulted an institute to perform a risk assessment. The Maritime Research Institute Netherlands (MARIN) was the only one using traffic data as part of their assessment. This data was obtained from the Vessel Traffic Services; the Scheldt Radar Network (read the following text box for more information).

The traffic data was used in the Safety Assessment Models for Shipping and Offshore in the North Sea (SAMSON)-model (read the following text box for more information).

[21] The Royal Decree of September 9, 2003; for the construction and exploitation of wind farms based on an EIA.

In 2008, during construction work, developers noted that ships were passing on a very short distance. The Coast Guard -structure was informed on this situation (read the following text box for more information).

Because the position and tracking system of the Scheldt Radar Network showed also clearly how ships were passing on a very short distance, it was decided under the Coast Goard-structure, to subject the OWF-zone to a study. For one month Automatic Identification System (AIS)-data from ships was collected. The AIS-data was used to follow ships and was used to recognize areas with high ship-densities. The AIS-data was mapped and compared with the delimitated Belgian OWF- zone. The comparison showed how four secondary shipping routes were cut off by the OWF- zone (see Figure 5) (read the following text box for more information).

Under the Coast Guard-structure it was decided that further studies had to be performed to solve this negative effect on the secondary shipping routes. The MDK and the Division for Ports and Water Policy[22] conducted the study. The outcomes of this study indicated that in favor of short sea shipping adjustments had to be made the OWF- zone.

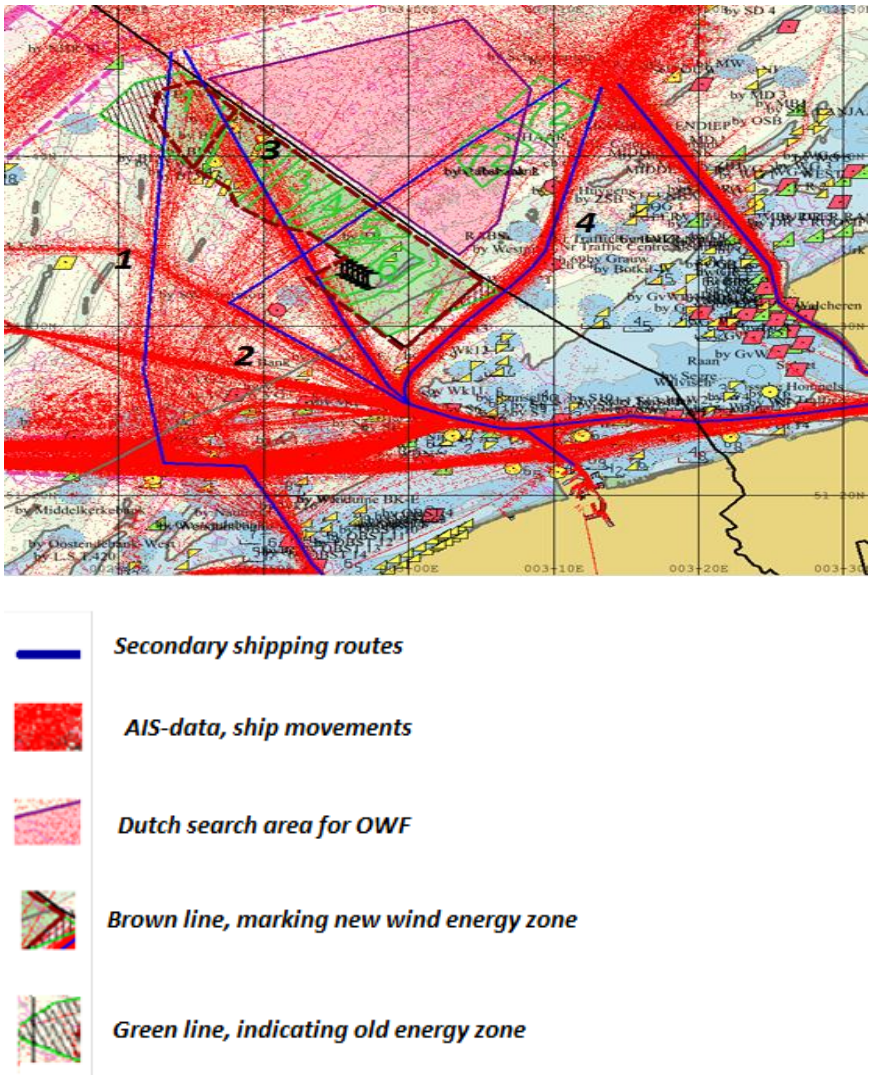

Figure 5, The numbers 1-4 are showing the routes which will be partly or fully cut off by the construction of the wind farms in the concession zone. The red lines indicate the ship movements during one month. The blue lines indicate the secondary shipping routes which will be cut off (A.Michaux 2009-2010).

The results of the study were discussed in the period April and May 2009 under the Coast Guard-structure. On basis of this study MUMM came out with an advice. They stated that an opening (corridor) should be realized in the middle of the OWF-zone allowing ships to make a short cut instead of making a detour. But several partners commented and disapproved against this amendment. One reason to reject the plan was the delimitation of a search area in the Dutch part of the North Sea, tight against the Belgian OWF-zone. The OWF in the Dutch part of the North Sea could close the corridor. Another reason was safety. When sailing through the corridor, windmills could disturb the radar system on board (A.Michaux 2009-2010).

[22]The Ports and Waterways Division plans ports policy and the long term vision for the Scheldt, and is working on integrated water management and marine policy, both in regional and international context. This includes also the policy of the ports and maritime access, the nautical policies and regulations around it, and inland waterway transport policy (http://www.bouwmeeaanvlaanderen.be).

A second advice from the MUMM, based on subsequent study performed by the MDK and its partner, was approved by all. A good passage for ships with a draft less than 14 meters heading towards Belgian or Dutch ports was ensured. For shipping heading towards the northern part of the United Kingdom a detour around the upper part of the OWF- zone was realized.

All the adjustments to the OWF-zone ensured more navigational space. Los of space in the OWF-zone delimitated have been won back by making the zone larger on places where this was possible (A.Michaux 2009-2010).

This advice resulted in an amendment on the Royal Decree of Mei 17, 2004. The new OWF-zone was subjected to a Strategic Environmental Assessment (SEA) (MUMM, Openbaar onderzoek en bespreking; Northwind 2011). The amendment was adopted in the Royal Decree of February 3, 2011.

3.2.2. Netherlands

Paragraph 3.1.2 indicated that important decisions were made in the preparation phase of the National Water Plan in order to prevent conflicts with the shipping-sector. The methods and techniques, which were used to identify OWF-development areas with the least disturbance to secondary shipping routes, are described here. An interview with Wim van Urk from the Directoraat Generaal- water (DG-water) helped to form a picture of the participative process. Karen Kooi from the organization which safeguards the interests of the wind energy-sector (NWEA) and Ben Scherpenzeel from the Royal Dutch Ship-owners Association (KNVR) were also consulted because their organizations took part in this participative process. The interview with Wim van Urk was face to face. A question list was sent to him prior to the interview. The interview with Karen Kooi and Ben Scherpenzeel were done by phone. The questions focused on the actions their originations undertook during the participative process.

Step2: Preparation of the plan

The Dutch government performed two planning process in order to identify the OWF-development areas with the least disturbance to secondary shipping routes. The first planning process was adopted under the NWP. This planning process leaded to the delimitation of two search areas. The second planning process would be adopted as an addition to the NWP. This planning process must lead to delimitation of two additional search areas.

Danish North VERITAS leaded the first planning process. During their assessments they made use of Automatic Identification Systems (AIS)-data, obtained from the Dutch Coast Guard. This data showed ship movements during a period of 14 days. Traffic and navigation routes, including the distribution of ships could be mapped. The data was also used in MARIN's; Safety Assessment Models for Shipping and Offshore in the North Sea (SAMSON)-model. The compatibilities between shipping and OWF's were studied with this model.

During the second planning process, IDON's project team shared and developed knowledge with and among stakeholders during meetings and workshops. During these meetings the Shipping Advisory group North Sea[23] represented the shipping-sector and the Nederlandse Energie Associatie (NWEA) represented the OWF sector (V&W. VROM. LNV. 2009). The OWF-developers but also the shipping-sector could now hand in their visions on maps. Each map showed one variant, indicating where OWF's should be delimitated when taking into account routeing-systems. The variants for the delimitation of OWF's were negotiated during stakeholder meetings and workshops organised by the project team of IDON.

[23](Scheepvaart Adviesgroep Noordzee) Consisting of: KVNR (Koninklijke Vereniging van Nederlandse Reders), NVKK (Nederlandse Vereniging van Kapiteins ter Koopvaardij), VOL (Vereniging Overzee Loodsen), (Nederlandse Coöperatie Loodsen), Kustwacht, VisNed (Coöperatieve Vereniging Kottervisserij Nederland), Havenbedrijf Amsterdam, Havenbedrijf Rotterdam

During the meetings the stakeholders could indicate which assessments should be performed to gain information on the suitability of their variants. Based on the results of these studies stakeholders could improvements their maps.

MARIN performed the first assessment. The SAMSON-model was used for this reason. The interim results of this assessment were discussed with the stakeholders during a meeting. The shipping-sector recommended on an additional assessment which resulted in a workshop organized by MARIN, attended by captains. During this workshop a question list had to be filled in. The questions focused on how the captains would act in potential difficult situations with OWF's. With this study the pros and cons of the variants were assessed. An additional study was done at the MARIN institute on a real-time bridge simulator because the captains indicated that the design of the previous study did not offer a good comparison with the real situation.

According to Wim van Urk from DG-water, the former government had to exert much pressure on the shipping-sector to ensure that they would compromise. But during the participative process a new government was elected with other interests. This leaded to less exerted pressure on the shipping-sector which made it harder to overcome conflicts of interest with them. Assessments as performed earlier during the participatory process were not in line with the requirements of the shipping-sector any more. According to Ben Scherpenzeel from the Shipping Advisory group North Sea, the assessments focused too much on scientific information instead of information from practical experience. More extensive assessments had to be performed to satisfy their interests (Project team Policy Note North Sea. 2011).

Some of the OWF's would be situated nearby or within existing TSS. To ensure ship safety the routeing-systems should be amended before OWF development could begin. To take in to account the interests of the shipping-sector all the maps were subjected to a Formal Safety Assessment .Insights obtained from this assessment would contribute to make a final adjustment to the maps and would help to choose the most favourable variant (Project team Policy Note North Sea. 2011) (read the following text box for more information).

From the participative process the choice was made for the variant which was developed by the OWF-sector (See figure 6). This variant met the challenge because;

-the subsidy cost were the lowest,
the realization of round 2 permits was still possible,
- and for shipping it was the safest option according to the Formal Safety Assessment.

This decision was however not supported by the shipping-sector. The lack of support was mainly formed due to the incorporation of round 2 permits in the area.

A second participative process concerning the delimitation of additional search areas has led to a compromise between the OWF-developers and the shipping-sector. The outcomes of this process had convinced the Minister I& M that there is a serious chance of realizing the OWF's in the permitted areas. In the beginning of 2012 an agreement was reached with the port authorities and energy-sector. Their solution was to chance the routeing-systems and transfer one permitted OWF to another area. With this agreement three OWF-projects can now be realized. Two are situated above the Frisian Isles and one with in the additional search area offshore the coast of Holland (Ministerie van Infrastructuur en Milieu. 2012).

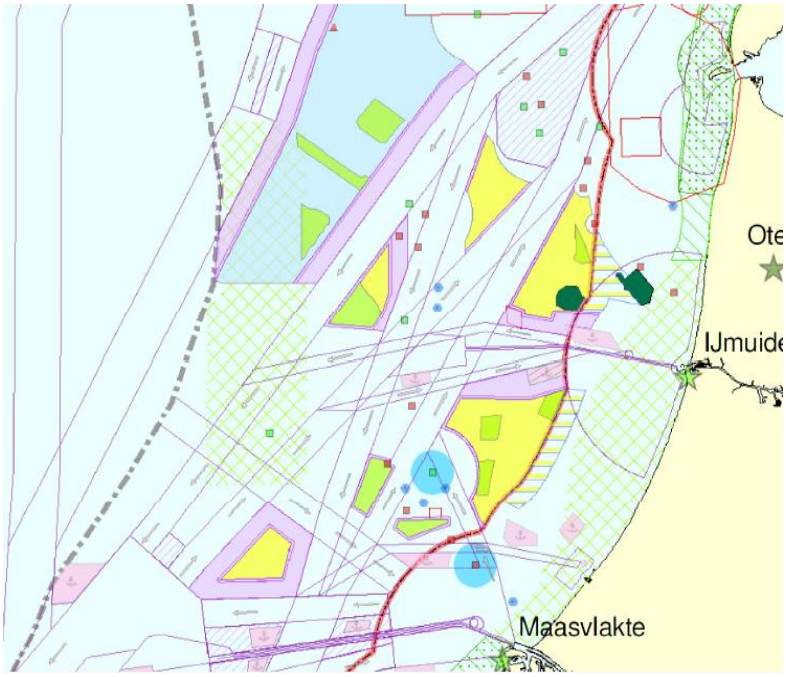

Figure 4, Variant of the OWF-sector (Interdepartmentale werkgroep 2009).

3.2.3. United Kingdom

Paragraph 3.1.3 indicated that the Chamber of Shipping disagrees with the step taking by the government before implementing the plan. Stakeholders are approached during the implementation phase instead of during the issue identification and assessment phase. During this study it was not possible to contact the Chamber of Shipping. Their opinion is retrieved from the Post Public Consultation Report on the latest SEA. Herein the Chamber of Shipping implies that comprehensive coverage has been given during the SEA to the issues that impact shipping operations, services and routes (DECC 2011).

The methods and techniques, used during the preparation on the SEA, are obtained from the website; MaritimeData.co.UK. E-mail contact with Susan Kidd of the Crown Estate and David Cantello from ENECO gave inside on the OWF-planning and permitting stratgy in relation to shipping used during the implementation phase and the cooperation between the OWF-developers and the shipping-sector (read the following text box for more information).

Step 1: Issue identification and assessment

The plans which were prepared during the second and third OWF-round were assessed under a SEA. The SEA which was performed to assess the environmental implications of the third OWF leasing round, was the second SEA performed in the United Kingdom in relation to the development of OWF's. Under this first SEA the plans of the second leasing round were assessed. The first SEA was performed by DECC's predecessor; the Department of Transport and Industry (DTI). Comments on the first SEA were that very little reference was given to navigational matters (K.N.Scott 2005).

The report "Navigational Hazards and the Energy Bill" issued by the House of Commons in 2004, noted that the steering group, which oversaw the execution of this SEA, omitted the representation of members of the maritime and navigational organizations and sectors. As a consequence to this; it appeared that the initial process was limited to DTI, the Crown Estate and the OWF-developers (K.N.Scott 2005).

Under the second SEA more attention was paid to navigational aspects. During the performance of the second SEA, DECC commissioned Anatec ltd[24] (Anatec) to collect maritime data around the United Kingdom continental shelf and to accommodate this online, in a Geographic Information System (GIS). The online-data base made it possible to promote the distribution and sharing of maritime data (www.maritimedata.co.uk 2010). This data is made available for commercial users and the general public on the website; MaritimeData.co.UK.

In relation to the SEA, maps created by Anatec, helped to indicate where shipping would conflict with OWF's. Anatec obtained data from the Maritime and Coastguard Agency (MCA), an agency of the Department for Transport responsible for maritime matters. MCA provided radar observations and Automatic Identification System-data (AIS-data). The AIS-data was collected during four weeks spread over the year 2008. The data covers the first seven days of each season aiming to take into account changes in patterns due to seasonal trade and environmental influences (DECC (a). 2009).

The MCA provided DECC with technical information concerning the location of routeing-systems and other shipping routes. Guidance on this is given in the document; Offshore Renewable Energy Installations (MGN 371) (MCA 2008). This guiding document was produced in 2007 as part of the Future Vessel Routing and Traffic Management Study for the United Kingdom. This study leaded to the development of a software model which would help MCA to underpin the planning of future vessel routing and traffic management requirements, and provided recommendations to manage future maritime risk (media.bmt.org 2007).

3.2.4. Chapter summary

This paragraph the results found under sub-question two, per step in the ICZM policy-cycle.

Step 1

From the three coastal states the United Kingdom is the only one who did not involve stakeholders during this step. The locations of the OWF-zones are indicated after the performance of scientific studies. Under the SEA the suitability of the nine OWF-locations were assessed. Automatic Identification System (AIS)-data helped to indicate where shipping would conflict with OWF's. In the first place this method seemed to lead to conflicts with the Chamber of Shipping, but in a consultation Report on the latest SEA the Chamber of Shipping stated that comprehensive coverage has been given during the SEA to shipping operations, services and routes.

On planning-level the Netherlands and Belgium made use of participatory methods to involve the shipping and the energy-sector in their planning process. The Netherlands organized a stakeholder meeting focusing on the tensions between these sectors. The shipping-sector and the OWF-sector were consulted concerning the safety zones around the OWF's. It was agreed with the shipping-sector to keep a distance of 2 nautical miles from routeing-systems .Together with the studies performed by MARIN the more and les suitable locations for OWF-development could be identified.

In Belgium the federal Minister responsible for the North Sea agreed with the Flemish Minister responsible for marine affairs to keep a safe distance of the TSS. The Flemish Minister advocated the interests of the shipping-sector. On planning-level this was the only stakeholder that was consulted on shipping matters.

[24] Anatec works within the UNITED KINGDOM, but also abroad, providing consultancy services on marine safety to several sectors including shipping and renewables (wind and wave) (www.maritimedata.co.uk 2010).

Step2
To collect data concerning secondary shipping routes in and around the OWF-zones or development areas, AIS-data is used. AIS-data is derived from Vessel Traffic Services. AIS-data can be used in studies to calculate the risk of an accident or to simply show that the OWF-zone or locations are compatible with secondary shipping routes.

The Maritime Research Institute Netherlands (MARIN) calculates in its Safety Assessment Models for Shipping and Offshore in the North Sea (SAMSON) the frequency of different types of "dangerous" events with shipping. MARIN is consulted by several OWF-developers, in Belgium and the Netherlands. In the Netherlands, MARIN performed the risk assessments on planning-level. The Dutch Coast Guard provided MARIN with the required AIS-data. In Belgium AIS-data and the use of risk assessments is a required part of the Environmental Impact Study which is performed on project-level.

In the United Kingdom, DECC used AIS-data from Anatec to map the areas with high ship densities as part of the SEA. Anatec manages a database which provides information on shipping movements within the water of the United Kingdom. This AIS-data is obtained from the Maritime and Coastguard Agency (MCA).With this data collision risk assessment can be calculated. In COLRISK, a model developed by Anatec, AIS-data is used to calculate the likelihood of a collision between ships, or a ship to structure collision (www.maritimedata.co.uk 2010). Also the Crown Estate made use of AIS-data in their marine spatial planning tool system (MaRS). Herein human activities are mapped and analyzed. With help of these maps potential viable zones for OWF development were indicated.

Besides computer data, incompatibilities' concerning the use of space by OWF's is also assessed by way of consultation or participation. On planning-level the Netherlands combined the information from the risk assessments with participatory methods. The participative process to locate the OWF's in the additional search area for the coast of Holland was partly used to overcome the conflicts formed during the second OWF-permitting round. The Dutch government has chosen to give the energy-sector and the shipping-sector responsibility to indicate where the OWF's should be located.

The shipping-sector and the OWF-sector could hand in their own maps which showed their variants where to delimitate the OWF's in the additional search areas. The suitability of the variants were assessed by MARIN (by performing a risk assessment), captains (by judging ship safety around the mapped OWF-locations) and by Arcadis Vectra (by preforming a Formal Safety Assessment). The variant created by the OWF-sector was the best option. This approach ensured that all conflicting situations are discussed on planning-level.The outcomes were submitted to the Minister of I&M as input to the decision making process concerning the delimitation of additional search areas. All incompatibilities in the plan concerning shipping could now be adapted. Despite the methods and techniques used by the Netherlands on planning-level, the implementation of the NWP has not leaded to the permitting of new OWF-projects.

Step 3, No information on this step.

Step 4
The implemented methods and techniques used in Belgium and the United Kingdom showed that the OWF-developers must conduct a study wherein secondary shipping routes in and around the project area are identified. In Belgium, AIS-data was not used on planning-level. The federal Minister for the North Sea based its decisions on the consultation rounds. AIS-data is used on project-level, during the Environmental Impact Study performed by the OWF-developers. OWF-developers have to asses' risks of collisions between ships and ship collisions with windmills as part of their Environmental Impact Study.

Unfortunately the planning methods and techniques used in Belgium could not prevent conflicts with secondary shipping routes. During construction work of the first windmills, developers noted that ships were passing on a very short distance. The Coast Guard -structure was informed on this situation. AIS-data coming from the position and tracking system of SRK showed also that ships were passing on a very short distance. Therefore it was decided to map the shipping density in and around the entire OWF-zone. The results showed that four secondary shipping routes were cut off. Therefore additional studies were performed to assess which changes to the OWF-zone had to be mate in favor of shipping, which make use of these routes. The adjustments to the coordinates of the OWF-zone were implemented under the Royal Decree of February 3, 2011 amending the Royal Decree of May, 17, 2004.

In the United Kingdom the use of AIS-data is combined with participatory methods on project-level. The use of participative methods is the responsibility of the OWF-developers. OWF-developers are advised by the MCA to perform a Formal Safety Assessment as part of their risk assessment. Anatec is one of the companies in the United Kingdom that performs risk assessments for OWF-developers. The Formal Safety Assessment should be performed under the Navigation Risk Assessment. In the Navigational Risk Assessment the OWF-developer demonstrates to the MCA that the delimitation of the OWF-development area does not increase the risk to shipping routes on an intolerable level. The Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms, a guiding document developed by the MCA, forms a template for the OWF-developers how to perform their Navigational Risk Assessment. The Navigational Risk Assessment is a required part of the EIA-process.

Step 5, No information on this step.

3.3. Lessons which can be learned

Data from the chapters above are put in the UNESCO 10 step planning approach to formulate advice on learning points from the Netherlands Belgium and the United Kingdom for future OWF-development projects. Table 1 shows the outcomes of the comparison between the UNESCO step by step approach and the planning process as performed by Belgium, the Netherlands and the United Kingdom. The UNESCO step by step approach shows how in an ideal situation a balanced decision could be formed. In this study the UNESCO step by step approach was a helpful document to find the right instruments to plan OWF's without conflicting with secondary shipping routes. The comparisons are listed in Appendix 6. Three critical points are circled in the table, and explained under the table.

Step	Task	NL	B	UK
1	1, Identify why MSP is needed.			
	2, Establish authority to plan for MSP			
	3, Establish authority to implement MSP			
3	1, Forming a multi-disciplinary team and developing a work plan.			
	2, Defining principles, goals and objectives.			
	3, Specifying boundaries and time frames			
4	1, Define who should be involved in MSP.			
	2, Define when to involve stakeholders.			
	3, Define how to involve stakeholders.			
5	1, Mapping important biological ecological areas.			
	2, Identifying spatial conflicts or compatibilities.			
	3, Mapping existing areas of human activities.			
6	1, Mapping future demands for ocean space.			
	2, Identifying alternative spatial scenarios.			
	3, Selecting a preferred spatial scenario.			
7	1, Identifying alternative spatial management.			
	2, Developing and evaluating the spatial management plan.			
	3, Approving the spatial management plan.			
8	1, Implementing the spatial management plan.			
	2, Ensuring compliance with the marine spatial management plan.			
	3, Enforcing the spatial management plan.			
9	1, Developing the performance monitoring program.			
	2, Evaluating performance monitoring data.			
	3, Reporting results of performance evaluation.			
10	1, Reconsidering and redesigning the maritime spatial planning program			
	2, Identifying applied research needs.			
	3, Starting the next round of maritime spatial planning.			

Table 1, Comparison between MSP step by step approach and the steps taken by Belgium, the Netherlands and the United Kingdom during their planning process.

The following legend can be used for the table:

Legend	
	Corresponds with the planning methods and techniques as described in the MSP-document
	Corresponds partly
	Does not correspond
	No information found
	Planning process is still running

Point 1
In the United Kingdom the OWF-zones, under the third OWF-round, are planned by the Crown Estate. According to Susan Kidd of the Crown Estate, such planning does not have any meaning in planning law and should not be confused with planning zones as used in the Netherlands and Belgium. The Crown Estate has indicated OWF-zones, but further actions should be taken by the OWF-developers. The absence of a predefined plan such as the "Master Plan" (in Belgium) and the National Water Plan (in the Netherlands) has not led to the cancelation of projects. It is however not yet clear if the planning process, carried out by the OWF-developer, will go without of conflicts. The Chamber of Shipping indicated that during the SEA, comprehensive coverage has been given to the shipping-sector on planning level. But that during the implementation of the plans focus is mainly laid down on environmental and economic impact, and not on maritime safety.

Most times national policies to designate, or zone marine space is formed on a sector by sector basis without too much consideration of effects on other human activities. Consequently this has led to conflicts among human uses (C.Ehler and F.Douvere. 2009). Such conflicts arose in Belgium and the Netherlands during the first attempts to develop OWF's. Therefore they chose to develop a plan wherein OWF-development is permitted in predefined zones after conducting a public process of analyzing and allocating the spatial and temporal distribution of human activities (C.Ehler and F.Douvere. 2009). Maybe the United Kingdom can afford to not make a marine spatial plan because they have enough marine space wherein each function can carry out their activity. With the DECC and the Crown Estate, the United Kingdom has a strong foundation to implement and implement plans to develop OWF's. The OWF-zones are authorised by central government with local authorities having no more than a consultative role. With OWF-development goals being placed above locally-expressed opinion the questions can be raised about the weight given to public attitudes (S. Jay. 2011). However, the United Kingdom is working on a marine spatial plan for the English part of the North Sea. Just as in the Netherlands, locations of future OWF-development areas will be delimitated more precisely on planning-level. During this planning process, the shipping-sector, just as the energy-sector can have a say in the planning process.

Point 2
In Belgium the former Flemish Administration of Waterways and Marine affair agreed on the location of the OWF-zone without considering the necessary spatial data to recognize secondary shipping routes. It was not until the project-level, during the construction of the first windmills, that the incompatibility of the OWF-zone with the secondary shipping routes became clear. Studies revealed that the OWF-zone was cutting off, and hindering four secondary shipping routes. The reason for this conflict can be led back to two aspects. The first aspect is defining who should be consulted during preparation of the plan. According to Ulrike Vanhessche from the Coast Guard-structure, concerning shipping the Flemish Minister of Waterways and Marine Affairs (AWZ) was the main stakeholder consulted by the former federal Minister responsible for the North Sea.

It is not clear whether the Minister of AWZ did not perform its job, as representative for the shipping-sector, correctly or that the shipping-sector itself did not see the problems would occur. It is however clear that the agreement to omit only the TSS was insufficient. A second aspect was the lack of shipping data. A clear picture of the future situation would properly lead to more awareness under the shipping-sector. According to the MSP-guide, the information from the participatory process should be combined with a wide range of baseline information. Trends and developments should also be predicted. This information is necessary in order to be able to assess spatial pressures at a later stage of the planning process. Mapping is put forward as the most important method to discover if human activities overlap. These overlaps will usually indicate conflicts.

The Netherlands and the United Kingdom used AIS-data to map secondary shipping routes. AIS-data was not used during the planning process in Belgium. AIS's onboard of ships were not yet obligated in 2003, when the location of the OWF-zone was delimitated. However, other data sources could be

used to map secondary shipping routes. With radar observations from the SRK, shipping routes around and in the OWF-zone could be mapped. This map could be used during the planning phase to make clear where the location of the OWF-zone is incompatible with shipping routes. This would make making it for the shipping-sector easier to identify what adverse effects the OWF-zone would have. With this map the shipping-sector could give concrete input to the planning process, making it easier to oversee future problems.

Point 3
Despite the spatial consideration made under the NWP, to realize OWF-projects, a strong foundation in favor for OWF-development from the government is missing in the Netherland. The old permitting regime was stopped, and a new permitting regime is still missing here. The integrated Water Act in the Netherlands arranged that ministries are legally obligated to make spatial planning decisions according to the NWP. But with political interest moving away from renewable solutions to produce energy, the money has moved away.Three OWF-projects which were permitted under round two received financial support from the government, whilst 12 projects were approved. In the Netherlands there is now technical assistance or regulations to ensure that the plan to develop 6000 megawatt wind energy on sea by 2020 is met. Rules form the framework wherein government's requirements are implemented. Technical assistance and education can ensure that the general requirements such as zoning regulations, permits and licenses will be effective (C.Ehler and F.Douvere. 2009). In the United Kingdom there is much support from the national government for the OWF-development process. The ZAP-strategy ensures that the OWF-developers will comply with the requirements of the Crown Estate. Within this strategy, much control is given to the developers. They must organize stakeholder meetings and ensure that assessments are performed. Such a strategy is missing in the Netherlands.

Lessons learned
The use of the sea is not exclusively reserved to shipping or for the development of OWF's ,therefore a right balance should be sought where the offshore wind parks can be developed as an economic activity and that ports experiences minimal economic loss. In an ideal situation this balancing is done on planning-level with all the responsible authorities, governmental departments and non-governmental organisations. Guidance from the government during the planning in this reduces the risk of conflicts during the execution of a plan. Therefore national governments must ensure that they have prepared a proper legal basis to enforce their plans. Rules form the framework wherein a governmental plan is enforced. The policy regarding the implementation of these rules must be resistant. This means that not every year policy is changed. In this way a sustainable environment is created in which the plans for the construction of OWF-developed can be achieved. These rules must regulate the following aspects:

-Where should the OWF be built (zoning),
- When is a OWF-developer eligible for a building permit (permitting regime),
- What must be examined before construction can begin (environment + spatial + risk aspects such as the risk of collision)
- Who should be involved in the research (stakeholders and independent scientific agencies)

It is important that the OWF-developers can execute their projects but this should not be at the expense of the shipping-sector. More and more coastal states are choosing to regulate the spatial aspects of their planning processes by way of zoning. Zoning is the result of compromises and a measure to delimitate areas for a particular use. The spatial aspects of a government plan can be enforced on the basis of zoning. A sectorial example of zoning is the delimitation of OWF-development areas. But for shipping zoning is also applied for. The International Maritime Organization manages the implementation of the international shipping routes by way of zoning. These international shipping routes are shown on navigational charts. By using these charts, planners can integrate the aspects concerning international shipping routes in their delimitation process to

locate the most suitable area for the OWF-zone. But unfortunately ships do not only make use of the international shipping routes.

There are ships, not constricted by their draft, which use routes outside the international shipping routes, this are the so called secondary shipping routes. In order to map the secondary shipping routes, planners have to getter their own data. From the Vessel Traffic Service centers AIS-data can be obtained. It is important that future situations are clearly mapped on the basis of technical information. But plans may not only depend on technical research. In an ideal process, the location of the OWF-zone is selected based on practical knowledge and theoretical research.

4. Conclusion

Under the direction of the European Union, member states are obligated to ensure that 20% of their energy production will be generated from renewable sources by the year 2020. Coastal states have decided to generate this energy from wind. Since the wind speeds and space on sea or larger then on land more and more coastal states plan their renewable energy activities offshore. Because there is no European guide showing which planning methods and techniques to use, coastal states have adopted plans using their own planning methods and techniques. Concerning the secondary shipping routes this has led to problems during the implementation of plans. In the case of the United Kingdom, questions are now raised about the weight given to public attitudes on planning-level. In Belgium the delimitated OWF-zone is incompatible with secondary shipping routes due to the absence of shipping data on planning-level. And in the Netherlands the governments willing to invest in OWF's is gone.

Looking back to the planning methods and techniques used to delimitate the most recent OWF-development areas with respect to secondary shipping routes, it can be stated that none of the coastal states have developed a single best way of planning. Each coastal state has a weak spot when it comes to planning. The study in this report showed that these weak spots occur on planning-level, which eventually leads to problems on project-level. The planning-level describes the phase wherein the national government first identifies issues and conducts assessments whereupon the plan will be adopted and eventually implemented by the authorized body. The planning-level described the first three steps of the ICZM policy-cycle. The project-level describes the last two steps, wherein the coastal states implement and evaluate their plans. Governmental support, the use of planning methods and techniques and the willing to participate with stakeholders are the three points that will be outlined here in order to make clear which lessons can be learned.

For the energy-sector it is important that the national government will support OWF-developments in their waters, financially but also with a well-defined permitting strategy. This strategy should include the terms on which the OWF-location has to be identified and how the projects must be developed in the zone. In this context the first lesson can be learned from the Netherlands. Despite the development of the National Water Plan, which formed a strong spatial foundation in favor for OWF-development, the willing to realize plans was missing. This leaded to less exerted pressure on the shipping-sector which made it harder to overcome conflicts of interest with them. A new permitting regime is also missing here and with political interest moving away from renewable solutions to produce energy, the money has moved away. In the United Kingdom the Zone Appraisal and Panning-strategy contains elements which ensure that the OWF-developers will comply with the requirements of the Crown Estate. The Crown Estate has also a share of 50 % in the projects. This helps the OWF-developer in funding their OWF-project.

For the shipping sector it is important that the OWF's are located. This report showed that zoning is often used to prevent that OWF-construction sites are scattered over a large sea area. Zoning ensures that the OWF's are located on a strategic place where they do not compete with other interests, such as short sea shipping. During the delimitation of an OWF-zone, secondary shipping routes are an important factor to consider. Automatic identification systems (AIS)-data is the most important source to find out where these routes are running. Information about ship movements can be retrieved from the Vessel Tracking Services. They obtain information form AIS's which are fitted on board of ships. With this information maps can be created showing areas with high shipping densities. Mapping is put forward as the most important method to discover if human activities overlap. The use of space is incompatible there where the maps show that the OWF-zone is overlapping with areas of high ship densities. Results like this help during the participative process, making it easier to oversee future problems. The shipping-sector can now give concrete input to the planning process. Due to the absence of AIS-data, planners were not familiar with shipping densities in around the Belgium OWF-zone; the OWF-zone in Belgium was therefore planned on top of

secondary shipping routes. The distance between the Traffic Separation System (TSS) “Noorhinder” was the only aspect that was taking into account when locating the OWF-zone.

For both sectors it is important that that they are consulted in order to give there fission. This should be done in an early phase of the planning process. OWF-developers have less risk of investing money in enforceable projects when conflicts are solved on planning-level. Belgium has chosen to consult the shipping-sector, by approaching a spokesman from the Flemish government. The fission of this stakeholder did however not meet the expectations of the shipping sector because the OWF-zone is now incompatible with secondary shipping routes. The Netherlands have taken the process of stakeholder involvement one step further by organizing meetings wherein both the energy representing and shipping representing non-governmental organizations could participate. Mapping is combined with participatory methods in order to search for the most suitable location for the OWF-development area. The shipping-sector and the OWF-sector could hand in their own maps which showed their variants, indicating where to delimitate the OWF’s. The suitability of the variants was assessed by way of calculations performed by MARIN, and experience from captains who judged ship-safety around the OWF-locations as indicated on the maps. The main lesson which can be learned from this is that in an ideal situation the government directs the planning process, but also offers a well-balanced plan with the use of the available methods and techniques. The methods and techniques which can be used during the planning process should be stated in a guiding document. A guiding document such as UNESCO step by step approach is in this case a helpful instrument.

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Appendix

Appendix 1 Routeing-systems on the North Sea

The International Maritime Organization (IMO) is the regulator on sea when it concerns maritime matters. They are the specialized agency of the United Nations and responsible for maritime safety, efficiency of navigation and prevention of marine pollution. Under the international convention for Safety of Life's At Sea (SOLAS) the IMO is recognized as the only international body that can develop maritime guidelines, criteria and regulations, on an international level.

The system which implements the "rules of the road" to be followed by ships and other vessels within the EEZ is set out under the International Regulations for Preventing Collisions at Sea (COLREG). The purpose of ship's routeing is to improve the safety of navigation in converging areas and in areas where the density of traffic is high or where freedom of movement of shipping is inhibited by restricted sea-room, the existence of obstructions to navigation, limited depths and unfavorable meteorological conditions. IMO keeps this system under continuous review by adopting new routing systems and amending or withdraw existing ones.

The system of one or more routes or routeing measures aimed to reduce risks of casualties includes:
- Traffic suppuration schemes (TSS); A routeing measure aimed at the separation of opposing stream of traffic by appropriate means and by the establishment of traffic routes.
- Two-way routes; A route within defined limits inside which two-way traffic is established, aimed at providing safe passage of ships through waters where navigation is difficult or dangerous.
- Areas to be avoided; A routeing measure comprising an area within defined limits in which eater navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by ships.
- Inshore traffic zones; A routeing measure comprising a designated area between the landward boundary of a TSS in the adjacent coast, to be used in accordance with the provisions of rules from COLREG.
- Precautionary area; An area within defined limits where ships must navigate with particular caution and within which the direction of flow of traffic may be recommended.
- Deep-water routes; A route within defined limits which has been accurately surveyed for clearance of sea bottom and submerged obstacles as indicated on the chart.

Fout! Verwijzingsbron niet gevonden.1 shows the current routeing-systems on the North Sea.

If an OWF interferes with a routeing-system an amended to the routeing-system needs to be requested to IMO's sub-committee on safety of navigation (NAV). Together with this request, information should be submitted concerning; their rights and practices in respect of the exploitation of living and mineral recourses, previously established routing systems in adjacent waters, the existing traffic pattern in the area concerned, foreseeable changes in the traffic pattern resulting from port of offshore terminal developments, the presence of fishing grounds, existing activities and foreseeable developments of offshore exploration or exploitation of the sea-bed and subsoil, the adequacy of existing aids to navigation, hydrographic surveys and nautical charts of the area, environmental factors, including prevailing weather conditions, tidal streams and currents and the possibility of the ice concentrations, and the existence of environmental conservation areas and foreseeable developments in the establishments of such areas. IMO's Formal Safety Assessment brings all this together in a five step approach.

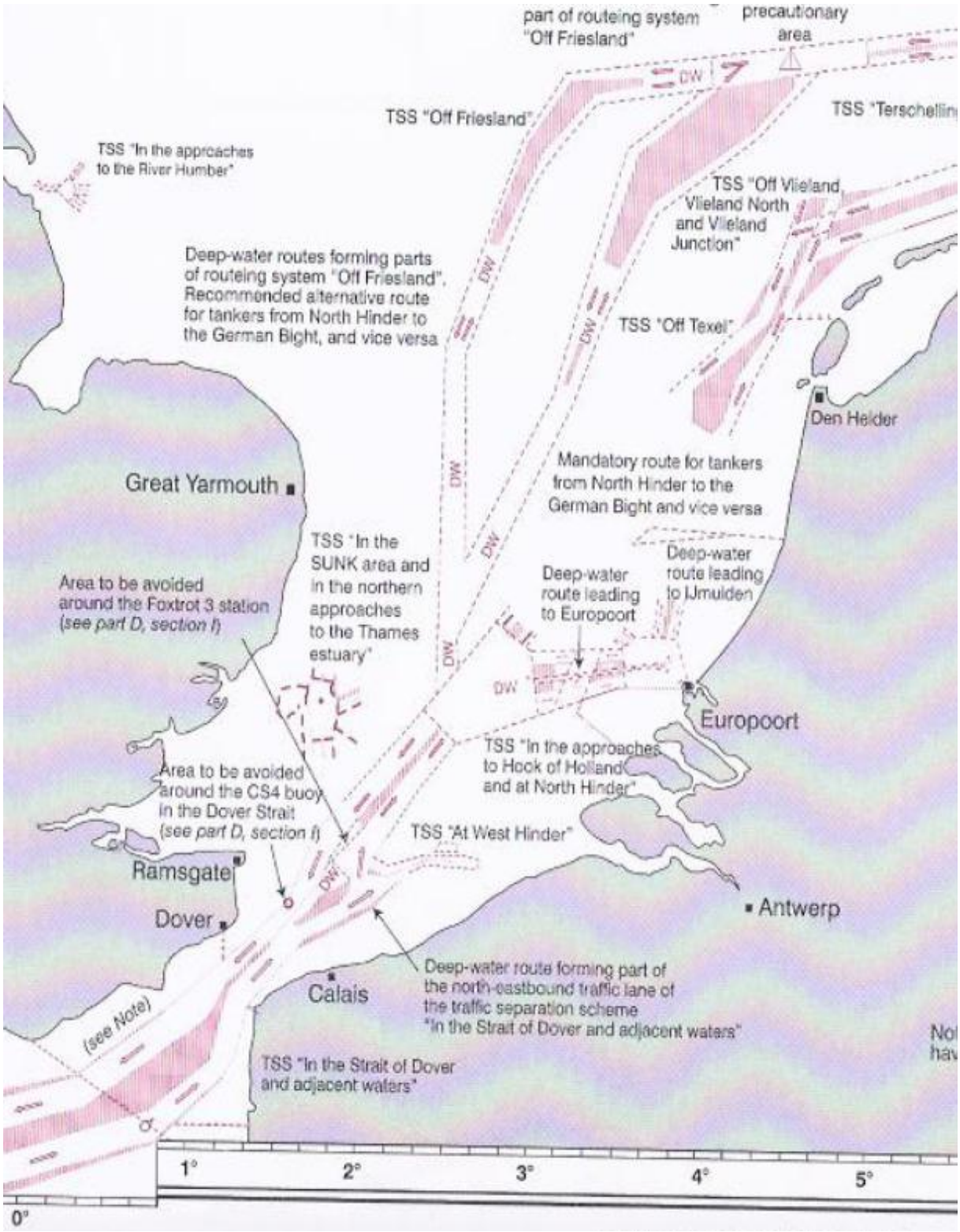


Figure 5, Current routeing-systems on the North Sea (IMO 2010)

Appendix 2 UNCLOS

The United Nations Convention on the Law of the Sea (UNCLOS) also referred to as the Law of the Sea Convention, defines the rights and responsibilities of coastal states in their use of the world's oceans. The convention has been ratified by 160 states. The Law of the Sea convention distinguishes both areas which fall within and beyond the national jurisdiction. The North Sea is a marine area which falls completely within the national jurisdiction of seven coastal states.

The area from the coastal baseline (which is most of the time indicated on basis of the mean low, low water spring line) until the 12 nautical miles line is designated as territorial water (see **Fout! Verwijzingsbron niet gevonden.**) . Here, coastal states have the right to set laws, regulate use, and use any resource. International shipping is given the rights of innocent passage, which means that a ship from another state has the right to enter and pass through territorial waters as long it is not prejudicial to the peace, good order or security of the owner. The area 200 nautical miles from the coastal baseline, beyond and adjacent to the territorial sea is designated as Exclusive Economic Zone (EEZ). Ratification of UNCLOS leads to the institution of the EEZ. Here; ships flying the flag of any state shall not suffer interference from other states.

A factor that could conflicts with this right is when the coastal state is using its exclusive right to place an object in sea. When a coastal state intends to do so, it should always guarantee the freedom of navigation. For safety matters coastal states *may* establish an exclusion zone around single offshore installations or structures. This exclusion zones shall be determined by the coastal State and shall not exceed a distance of 500 meters from each point of the outer edge of the installations (UNCLOS, article 60).

(EEZ) is not automatic consequence of sovereignty; such a zone must be claimed. As a non-signatory of the Unite Nations Law of the Sea Convention (UNCLOS) the United Kingdom has chosen not to claim an EEZ. Like other non-signatory (such as the United States of America and the federal Republic of Germany) the United Kingdom declared the deep sea bed as “common heritage for mankind”; which means that common heritage (cultural and natural) should be held in trust for future generations and be protected from exploitation. The reason for the United Kingdom to not implement the regulations from UNCLOS was that it would be an obligation to precede any working in this area through an international body (T.Swanson. 1999).

Coastal states which have implemented the regulations as set under UNCLOS may ensure that a safety zone of 500 meters is delimitated around single structures which are developed within the Exclusive Economic Zone (EEZ). The mention of the International Maritime Organization (IMO)/UNCLOS safety zone at 500 meters does not need to be applied for wind farms, but can be considered.

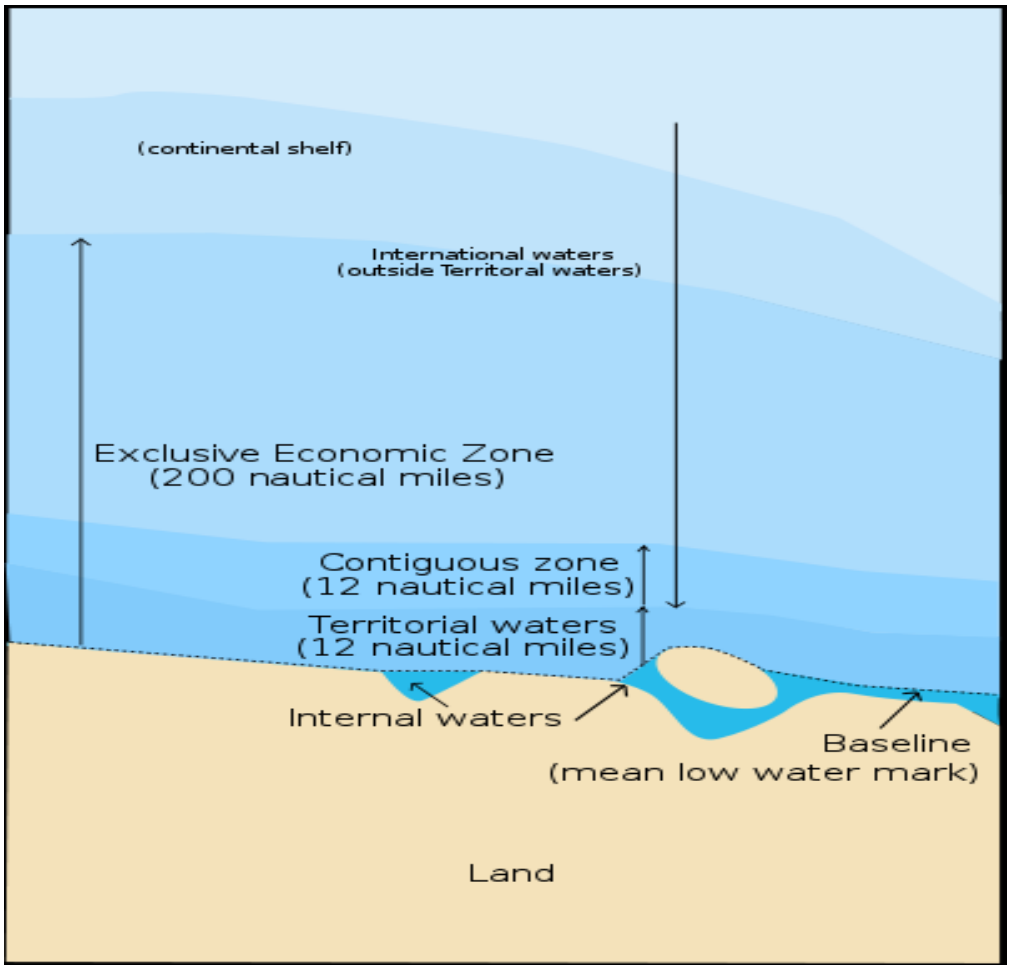


Figure 9, the lines indicate the location of the territorial waters and the EEZ (http://en.wikipedia.org/ .).

Appendix 3 Abbreviations

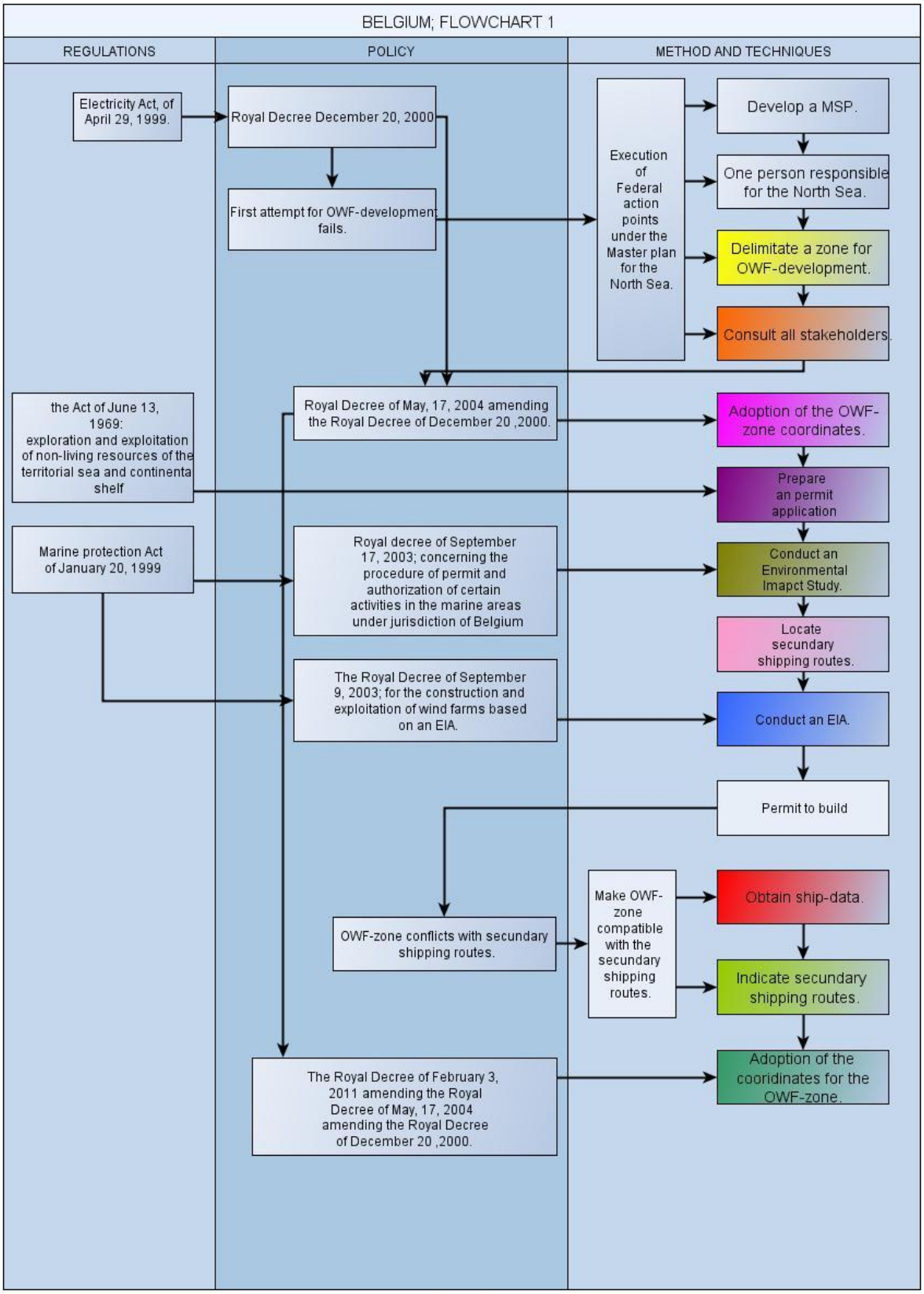
AIS	Automatic Identification Systems
AWZ	Flemish Administration of Waterways and Marine Affairs
CE	Crown Estate
COLREG	International Regulations for Preventing Collisions at Sea
CREG	Commission for the Regulation of Electricity and Gas
DECC	Department of Energy and Climate Change
DSS	Deep Sea Shipping
EC	European Commission
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EL & I	Ministry of Economic Affairs, Agriculture and Innovation
ES	Environmental Statement
EU	European Union
IDON	The Integral Directors Board North Sea
IMO	International Maritime Organization
IMPN 2015	Integrated Management Plan for the North Sea 2015
I & M	Ministry for Infrastructure and Environment
IPC	Infrastructure Planning Commission
KVNR	Koninklijke Vereniging van Nederlandse Reders
MARIN	Maritime Research Institute Netherlands
MaRS	Marine Resource System
MCA	Maritime and Coastguard Agency:
MDK	the Agency for Maritime Services and Coast:
MSP	Marine Spatial Planning
MUMM	Management Unit of the North Sea Mathematical Models and the Scheldt estuary
NWEA	Nederlandse Wind Energie Associatie
NWP	National Water Plan
OWF's	Offshore Wind Farms
REZ	Renewable Energy Zone
RD	Royal Decree
SEA	Strategic Environmental Assessment
SOLAS	International convention for Safety of Life's At Sea
SRK	Scheldt Radar Network
SSS	Short Sea Shipping
TSS	Traffic suppuration schemes
UNESCO	The United Nations Educational Scientific and Cultural Organization
ZAP	Zone Appraisal and Planning
ZDA	Zone Development Agreement

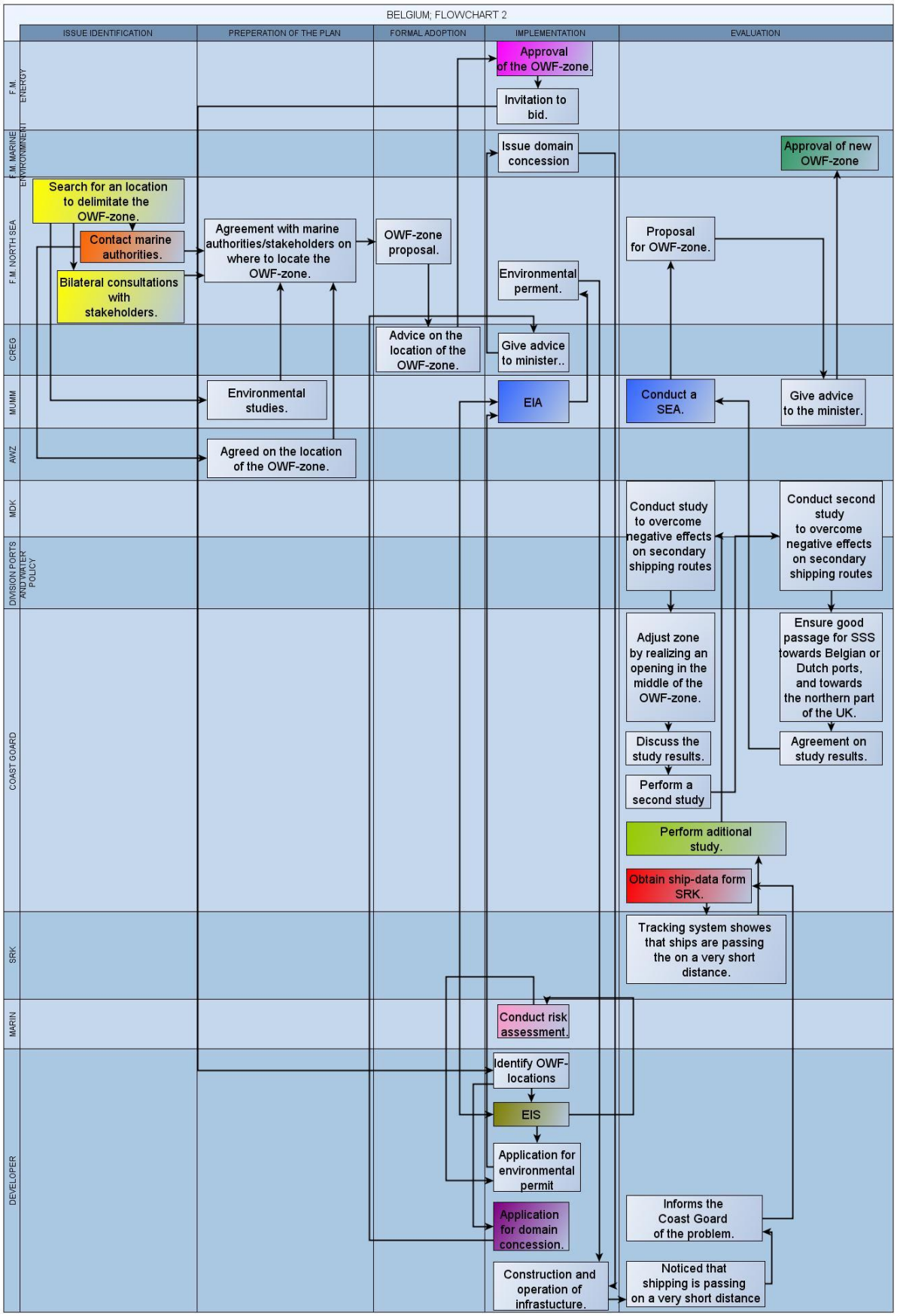
Appendix 4 Flowchart planning cycles

This appendix contains three flowcharts, one for the Netherlands, one for Belgium and one for the United Kingdom. The contents and structure is based on the information coming from chapter 3.1. and 3.2. The flowcharts are summarizing the planning methods and techniques which were used to manage the development of OWF's and to indicate secondary shipping routes.

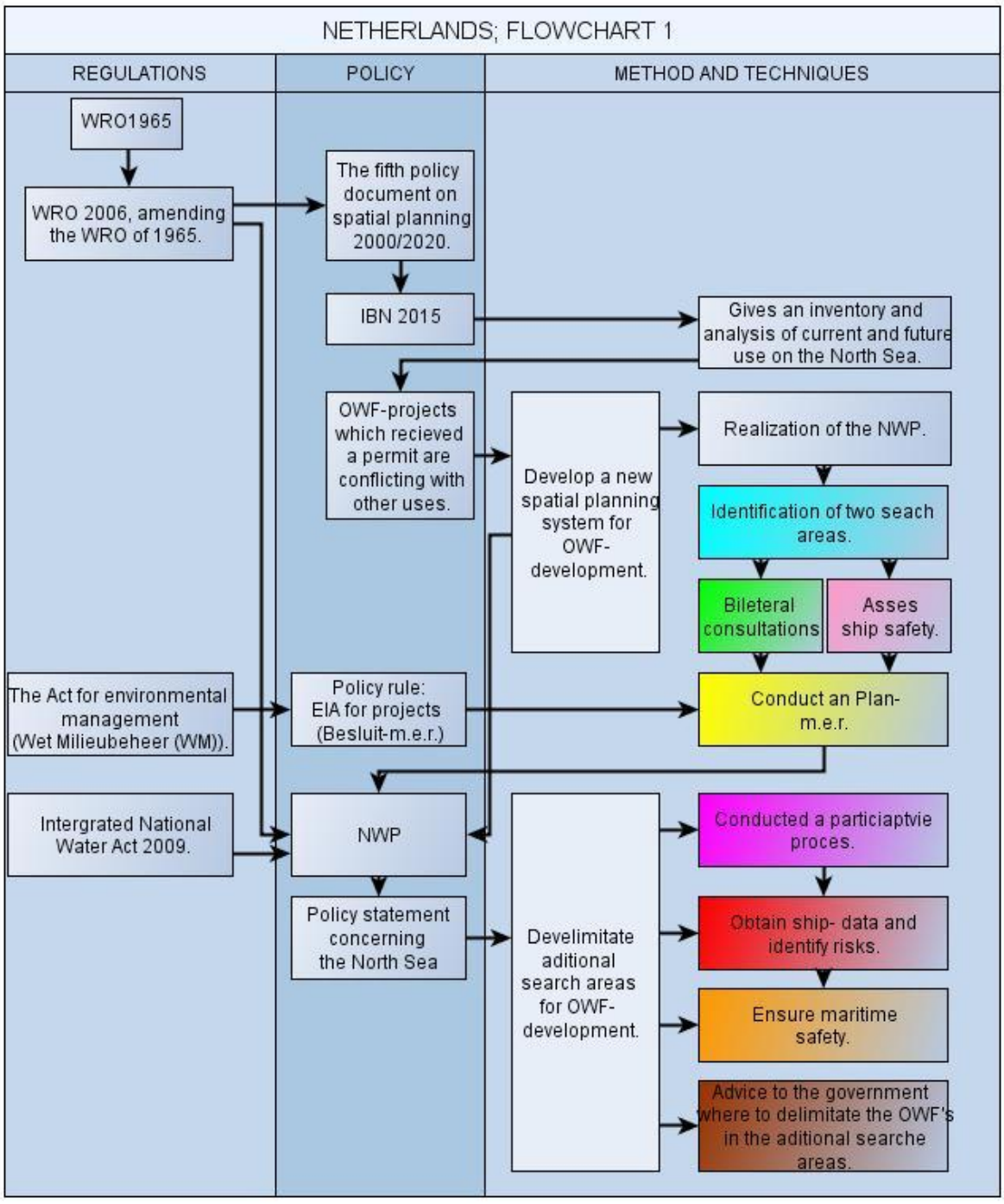
For each coastal state two flowcharts are developed. The first flowchart shows the legal basis to perform the planning methods and techniques. Each single method or technique has been given a color. These colors can be found in the second flowchart which shows the planning process. This color scheme makes it possible it see which method or technique was used during the planning process, and by whom it is used.

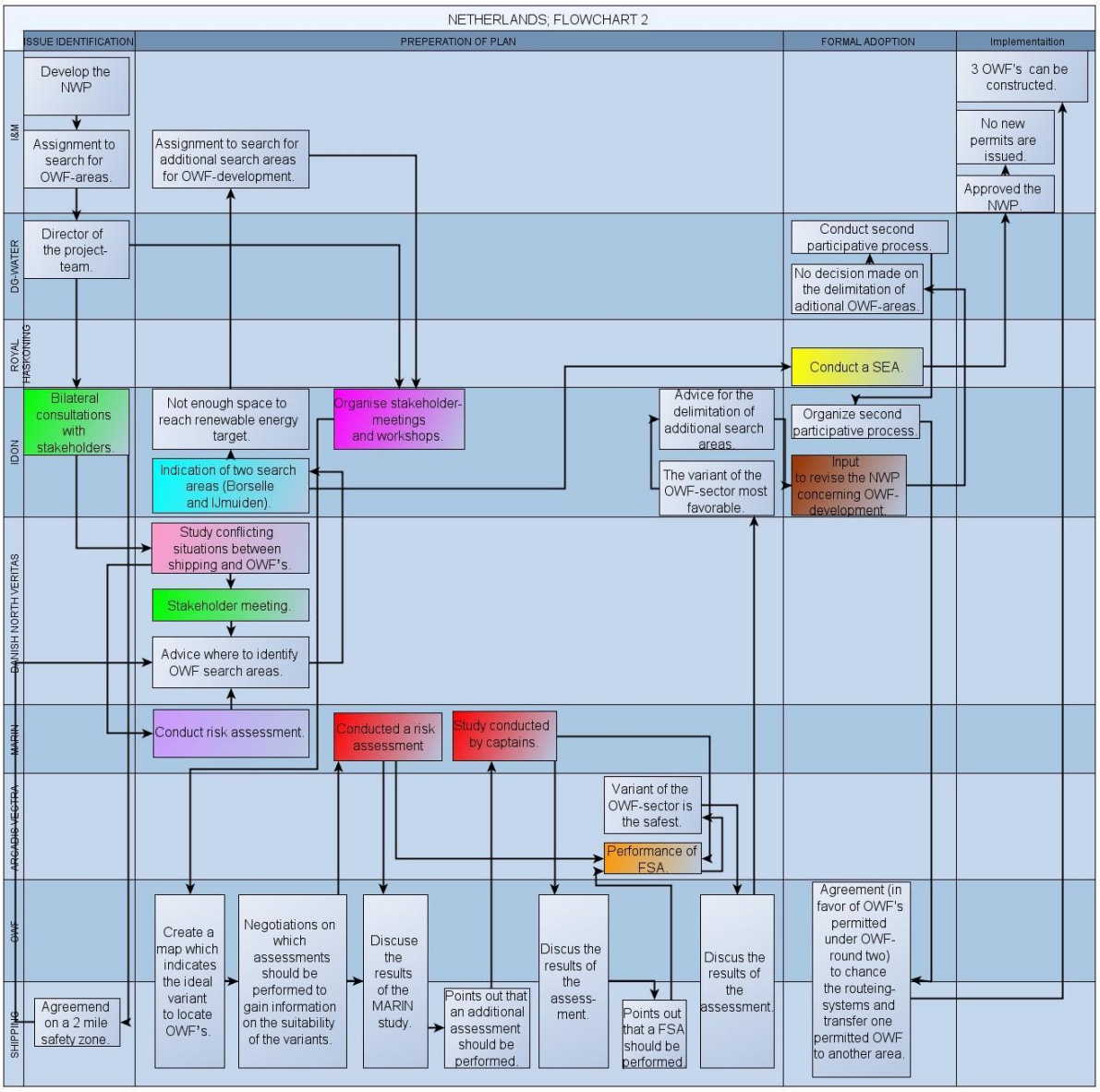
BELGIUM


BELGIUM; FLOWCHART 1
REGULATIONS
POLICY
METHOD AND TECHNIQUES
Electricity Act, of April 29, 1999.
Royal Decree December 20, 2000
First attempt for OWF-development fails.
Execution of Federal action points under the Master plan for the North Sea.
Develop a MSP.
One person responsible for the North Sea.
Delimitate a zone for OWF-development.
Consult all stakeholders.
the Act of June 13, 1969: exploration and exploitation of non-living resources of the territorial sea and continenta shelf
Royal Decree of May, 17, 2004 amending the Royal Decree of December 20 ,2000.
Adoption of the OWF-zone coordinates.
Prepare an permit application
Marine protection Act of January 20, 1999
Royal decree of September 17, 2003; concerning the procedure of permit and authorization of certain activities in the marine areas under jurisdiction of Belgium
Conduct an Environmental Imapct Study.
Locate secundary shipping routes.
The Royal Decree of September 9, 2003; for the construction and exploitation of wind farms based on an EIA.
Conduct an EIA.
Permit to build
OWF-zone conflicts with secundary shipping routes.
Make OWF-zone compatible with the secundary shipping routes.
Obtain ship-data.
Indicate secundary shipping routes.
The Royal Decree of February 3, 2011 amending the Royal Decree of May, 17, 2004 amending the Royal Decree of December 20 ,2000.
Adoption of the cooridinates for the OWF-zone.

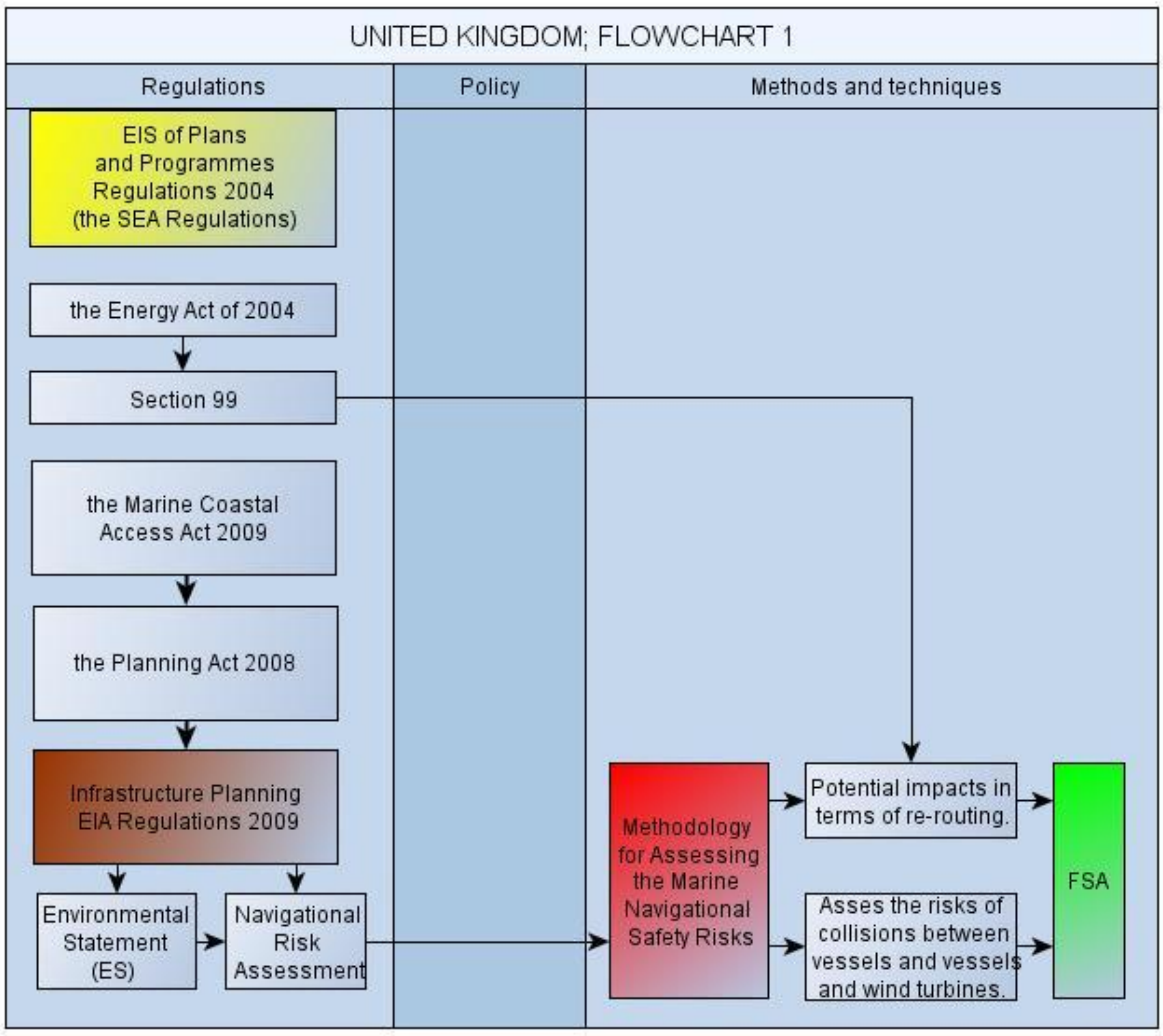

BELGIUM; FLOWCHART 2
ISSUE IDENTIFICATION
PREPERATION OF THE PLAN
FORMAL ADOPTION
IMPLEMENTATION
EVALUATION
F.M. ENERGY
F.M. MARINE ENVIRONMENT
F.M. NORTH SEA
CREG
MUMM
AWZ
MDK
DIVISION PORTS AND WATER POLICY
COAST GOARD
SRK
MARIN
DEVELOPER
Approval of the OWF-zone.
Invitation to bid.
Issue domain concession
Approval of new OWF-zone
Search for an location to delimitate the OWF-zone.
Contact marine authorities.
Bilateral consultations with stakeholders.
Agreement with marine authorities/stakeholders on where to locate the OWF-zone.
OWF-zone proposal.
Proposal for OWF-zone.
Environmental perment.
Advice on the location of the OWF-zone.
Give advice to minister..
Environmental studies.
EIA
Conduct a SEA.
Give advice to the minister.
Agreed on the location of the OWF-zone.
Conduct study to overcome negative effects on secondary shipping routes
Conduct second study to overcome negative effects on secondary shipping routes
Adjust zone by realizing an opening in the middle of the OWF-zone.
Ensure good passage for SSS towards Belgian or Dutch ports, and towards the northern part of the UK.
Discuss the study results.
Agreement on study results.
Perform a second study
Perform aditional study.
Obtain ship-data form SRK.
Tracking system showes that ships are passing the on a very short distance.
Conduct risk assessment.
Identify OWF-locations
EIS
Application for environmental permit
Application for domain concession.
Informs the Coast Goard of the problem.
Construction and operation of infrastucture.
Noticed that shipping is passing on a very short distance

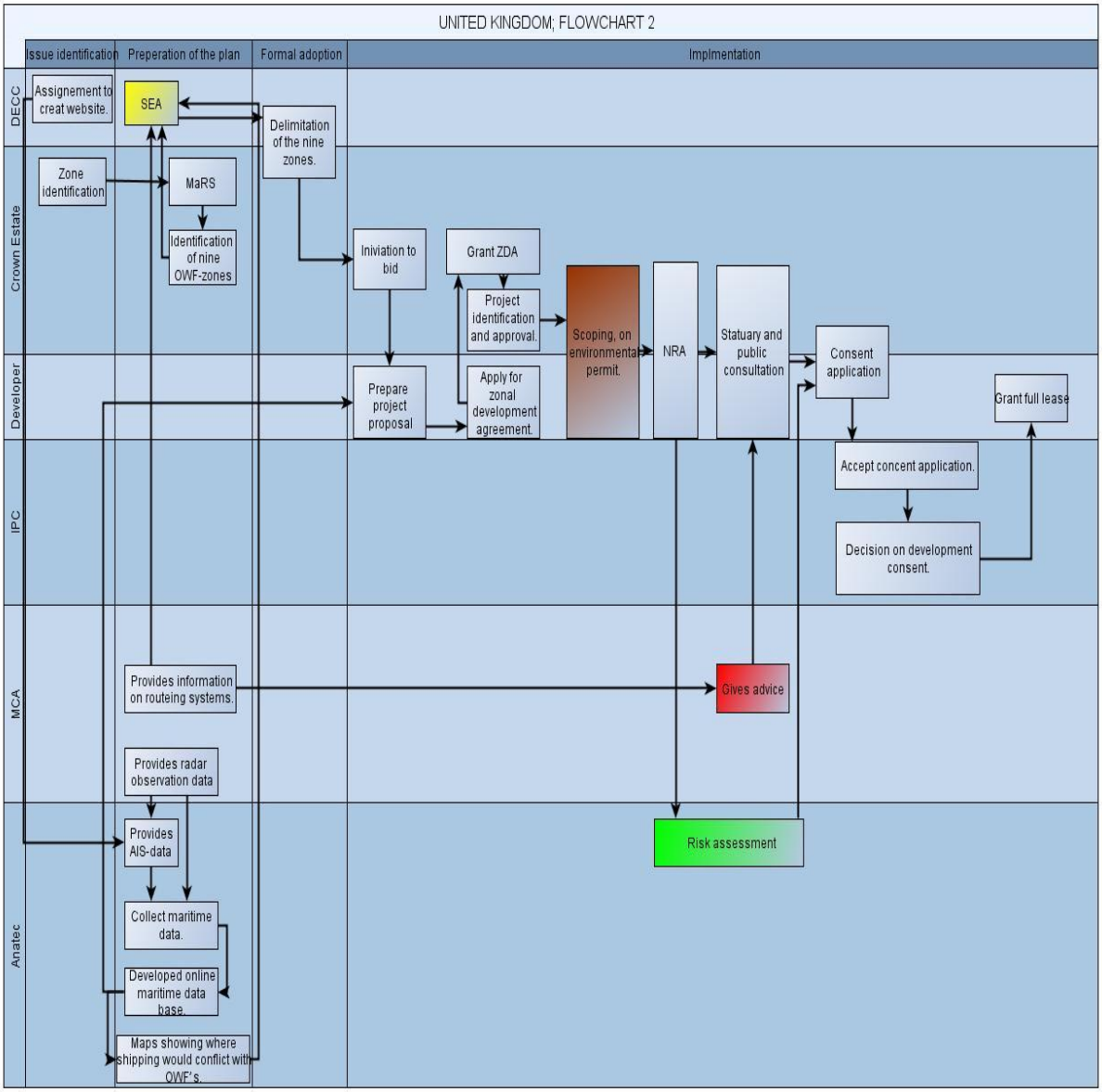
NETHERLANDS




NETHERLANDS; FLOWCHART 2
ISSUE IDENTIFICATION
PREPERATION OF PLAN
FORMAL ADOPTION
Implementaition
I&M
DG-WATER
ROYAL HASKONING
IDON
DANISH NORTH VERITAS
MARIN
ARCADIS-VECTRA
OWF
SHIPPING
Develop the NWP
Assignment to search for OWF-areas.
Director of the project-team.
Bilateral consultations with stakeholders.
Assignment to search for additional search areas for OWF-development.
Not enough space to reach renewable energy target.
Organise stakeholder-meetings and workshops.
Indication of two search areas (Borselle and IJmuiden).
Study conflicting situations between shipping and OWF's.
Stakeholder meeting.
Advice where to identify OWF search areas.
Conduct risk assessment.
Conducted a risk assessment
Study conducted by captains.
Create a map which indicates the ideal variant to locate OWF's.
Negotiations on which assessments should be performed to gain information on the suitability of the variants.
Discuse the results of the MARIN study.
Points out that an additional assessment should be performed.
Discus the results of the assess-ment.
Points out that a FSA should be performed.
Variant of the OWF-sector is the safest.
Performance of FSA.
Discus the results of the assessment.
Advice for the delimitation of additional search areas.
The variant of the OWF-sector most favorable.
Conduct a SEA.
Conduct second participative process.
No decision made on the delimitation of aditional OWF-areas.
Organize second participative process.
Input to revise the NWP concerning OWF-development.
Agreement (in favor of OWF's permitted under OWF-round two) to chance the routeing-systems and transfer one permitted OWF to another area.
Agreemend on a 2 mile safety zone.
3 OWF's can be constructed.
No new permits are issued.
Approved the NWP.

UNITED KINGDOM




UNITED KINGDOM; FLOWCHART 2
Issue identification
Preperation of the plan
Formal adoption
Implmentation
DECC
Crown Estate
Developer
IPC
MCA
Anatec
Assignement to creat website.
SEA
Delimitation of the nine zones.
Zone identification
MaRS
Identification of nine OWF-zones
Iniviation to bid
Grant ZDA
Project identification and approval.
Scoping, on environmental permit.
NRA
Statuary and public consultation
Consent application
Grant full lease
Prepare project proposal
Apply for zonal development agreement.
Accept concent application.
Decision on development consent.
Provides information on routeing systems.
Gives advice
Provides radar observation data
Provides AIS-data
Risk assessment
Collect maritime data.
Developed online maritime data base.
Maps showing where shipping would conflict with OWF's.

Appendix 5 Marine Spatial Planning Step by Step Approach

In this appendix spatial decision making process as outlined in the UNESCO 10 step planning approach is outlined. The steps are placed within the five steps as described in the ICZM policy-cycle. Each step is subdivided in to three tasks which give information on the outputs that should be delivered from each step.

Please note that step 2 is not considered during this research. This step focuses on the financing of marine spatial plans. Information about this item was hard to find.

1. Issue identification and assessment

1. Identifying need and establishing authority

a. Identify why MSP is needed.

b. Establish authority to plan for MSP:
-Creation of new legislation or,
-departing from existing legislation or,
-Re-interpret existing legislation.

c. Establish authority to implement MSP:
-Create one comprehensive organization specially designed for MSP or,
-Arrange MSP under existing organizations or,
-Use a mixed approach.

3. Organizing the process through pre-planning

a. Forming a multi-disciplinary team and developing a work plan.

b. Defining principles (which can be derived from international treaties and agreements or national policy and legislation) goals and objectives.

The goals and objectives should be derived from step 1.
Goals can be:
-the promotion of appropriate use of marine space or,
-reducing and resolving conflicts.

c. Specifying boundaries and time frames which consists of:
- A base period to provide a common or standard basis for identifying "current" conditions (Step 5) and,
-Target period that defines the period to plan for and to allow to identify "future conditions (Step 6).

2. Preparation of the plan

4. Organizing stakeholder participation

a. Define who should be involved in MSP.
Groups or organizations that should be considered are those:
-Who will be affected by MSP decisions;
-Who depend on the resources of the management area;
-Who have or make legal claims or obligations over areas or resources within the management area;

-Who have special seasonal or geographic interests in the management are;
-Who have a special interests in the management area.

b. Define when to involve stakeholders.
Different stakeholders can be approached for participation during all the five steps of the ICZM policy-cycle. But ideally stakeholder participation should be organized as early as possible.

c. Define how to involve stakeholders.
There are different ways to involve stakeholders. Different types of stakeholder participation and their outcomes are listed here;
-Negotiation: reach decision;
-Concertation: Determine a common decision;
-Dialogue: Develop understanding;
-Consultation: Reciprocal floor;
-Information;
-Communication: One-way flow.

5. Defining an analyzing existing conditions

a. Mapping important biological ecological areas.

b. Identifying spatial conflicts or compatibilities.
Obtain data to indicate areas important to human activities.

c. Mapping existing areas of human activities.
Asses if compatibilities occur which may indicate a conflict.

6. Defining and analyzing future conditions

a. Mapping future demands for ocean space.
Define a time frame for the analysis.
Look ad historical trends or ask the marine uses about future needs of space.
Visualize the needs of space on maps.

b. Identifying alternative spatial scenarios.
Indicate in the scenarios:
-Places of concentration in the management area resulting of the choices of objectives (step 3);
-Areas for special protection;
-Spatial relations between different areas;
-Spatial networks (e.g., routeing-systems).

c. Selecting a preferred spatial scenario.
The selected scenario will form the basis for implementation and selecting management measures (Step 7).

3. Formal adoption and funding

2. Obtaining financial support

a. Identifying alternative financing mechanisms.

b. Defining the feasibility of alternative funding mechanisms.

7. Preparing and approving the spatial management plan

a. Identifying alternative spatial management.
This measure leads to the specification of how, where, and when human activities may occur. This measure includes the:
-Delimitation of safety zones and;
-Zoning of areas.

Incentives can be used to implement the measures. There are two types of incentives:
- Economic (grants or fees);
-Non-economic (regulatory, technical assistance and enforcement sanctions).

b. Developing and evaluating the spatial management plan.
Zoning is often the principle management measure used to implement a spatial management plan. Zoning is often in the form of a legal document included in the spatial management plan. Key elements of a zoning plan are:
-Locating and delimitation of a zone bases on the information from step 5 and 6;
-Designation of a system of permits, licenses and use rules;
-Establishing compliance mechanisms;
-Creating programs to monitor, review and adopt the zoning system.

Most countries require now that the spatial management plans should be subjected to a Strategic Environmental Assessment (SEA).

c. Approving the spatial management plan.
This task will entail at least the following considerations:
-Formal adoption of the spatial management plan;
-Approving any new changes in management boundaries;
-Establishing any new institutional arrangement;
-Approving any new staffing or organizational changes, if necessary;
-Approving the allocation of new funds to implement;
monitor and evaluate the marine spatial plan, if proposed.

4. Implementation

8. Implementing and enforcing the spatial management plan measures

a. Implementing the spatial management plan.
Single sector management institutions can use the comprehensive plan and the zoning plan as guides for permitting.

b. Ensuring compliance with the marine spatial management plan.
Compliance can be encouraged by a number of actions including:
-Educating the public and other stakeholders about plans;
-Developing 'codes of conduct' through agreements with various stakeholders;
-Technical assistance through which governmental agencies provide information on the spatial management strategies.

c. Enforcing the spatial management plan.
Enforcement by the government usually includes:
-Inspections to determine the compliance status of the regulated human activities and to detect violations;
-Negotiations with managers of activities that are out of compliance to develop mutually agreeable schedules and approaches for achieving compliance;

-Legal actions, where necessary, to compel compliance and to impose some consequence for violating the law.

5. Evaluation

9. Monitoring and evaluating performance

a. Developing the performance monitoring program.
The objectives may have been modified during the planning-process; therefore they should be re-confirmed with stakeholders. Existing problems emerged from the implemented management measures should be reformulated into a set of positive outcomes. Indicators should be established in order to assess conditions and trends, as well as help to evaluate the effectiveness of management measures.

b. Evaluating performance monitoring data.
Review the results of actions taken and assessing whether these actions have produced the desired results.

c. Reporting results of performance evaluation.

10. Adopting the spatial management process

a. Reconsidering and redesigning the maritime spatial planning program.

b. Identifying applied research needs.

c. Starting the next round of maritime spatial planning.

Appendix 6 Comparison
BELGIUM

MARINE SPATIAL PLANNING STEP BY STEP APPROACH

1. Issue identification and assessment

1. Identifying need and establishing authority

a. The development of a MSP was needed because the first attempt for OWF-development failed (D.Bogaert., 2008).

b. Authority to establish the MSP itself is not created by legislations. The government based its thoughts on the Master Plan, which consists of arrangements made on federal level. Existing legislation would be used as departure point in order to establish authority to delimitate an OWF-zone (D.Bogaert. 2008).

c. Authority to implement MSP was arranged by the Minister responsible for the North Sea (C.Plasman. 2007).

3. Organizing the process through pre-planning

a. The North Sea Minister was the head person of the Task Force for the North Sea. This Task Force consisted of federal departments with responsibilities on the North Sea C.Plasman. 2007).

No information was found on the use of a work plan.

b. The objective concerning OWF-development was to delimitate one zone where projects could be realized. The goal was to reduce conflicts between marine users. Therefore decision on the location of the OWF-zone was negotiated with all marine users (interview Ulrike Vanhessche).

c. No information is found on the development of time frames or boundaries of the spatial management plan.

2. Preparation of the plan

4. Organizing stakeholder participation

a. For the shipping-sector the bilateral negotiations were only taken with the Flemish Administration responsible for marine affairs (interview with Ulrike Vanhessche).

b. The stakeholders were consulted during the pre-planning phase and the project phase.

c. It was negotiated with the stakeholders where the OWF-zone should be located.

5. Defining an analyzing existing conditions

a. The MUMM supported the OWF-zone delimitation process by choosing the most suitable location when taking into account the marine environment.

b. Information from the bilateral negotiations, conducted by the federal Minister for the North Sea, was the main basis to identify spatial conflicts or compatibilities.

c. Did not mapped or collected information about the ship densities in and around the potential OWF-zone.

6. Defining and analyzing future conditions

a. Mapped future demands for marine space for the OWF-sector and the sand extraction sector. The federal Minister for the North Sea asked the marine uses about future needs of space. For shipping this question was only asked to the Flemish minister responsible for marine affairs (interview Ulrike Vanhessche).

b. The federal Minister for the North Sea did not used alternative spatial scenarios during the execution of the Master Plan. The federal Minister for the North Sea formed an agreement with marine users, on multiple use of space in the OWF-zone.

   A safe distance was kept from routeing-systems (J.Stubbe 2010).

c. Agreement was reached with the marine users on the location of the OWF-zone.

3. Formal adoption and funding

2. Obtaining financial support

a. ?

b. ?

7. Preparing and approving the spatial management plan

a. How, where, and when human activities OWF-development can occur is specified in the Royal Decree of 2004. Herein the coordinates of the OWF-zone are adopted. Only within this OWF-zone, development is allowed. OWF-developers have to delimitate a safety zone around their project area.

   Fees are granted by the government to stimulate OWF-developers to build in the zone. Regulations and Royal Decrees are used to implement the OWF-development measures.

b. Zoning was the principle management measure to delimitate the OWF-development area. The Royal Decree of 2004 was the legal basis to implement the OWF-zone. The zoning plan is not part of a sector offer crossing spatial management plan.

   Permits would be granted to the OWF-developers.

   The MUMM created an environmental monitor program.

   The OWF-zone which is delimitated under the Royal Decree of 2004 was not subjected to a SEA.

c. The OWF-zone was approved.

4. Implementation

8. Implementing and enforcing the spatial management plan measures

a. The OWF-developers must require for an environmental permit and a concession permit.

b. The MUMM is the main governmental body which ensured compliance with the zoning plan. The environmental impact study performed by the developers is evaluated by MUMM. On each part that not meets the requirements, MUMM can ask the developer to perform additional assessments.

c. No information found on this action point.

5. Evaluation

9. Monitoring and evaluating performance

a. No information could be found on monitoring programs defined concerning the effects on marine aspects other than the environment.

During the construction of the first windmills, on safe situations with shipping were detected (interview Ulrike Vanhessche).

Modification to the OWF-zone had to be realized due to this on-safe situation. The negative effects to shipping were studies in order to adjust the OWF-zone. The new objectives were negotiated with the stakeholders under the Coast Guard-structure. These measures were implemented but this not resulted in positive outcomes for the shipping-sector.

b. Not all stakeholders agreed on the new measures because they would lead to new problems with the shipping-sector. New studies were conducted to form new objectives. For a second time it was negotiated with the stakeholders if the outcomes were satisfying. The negotiations under the Coast Guard-structure resulted in to the final adjustments. The outcomes were again not positive for the shipping-sector (A.Michaux 2009-2010).

The outcomes were agreed on which formed the basis for the amendment of the Royal Decree of 2004.

c. No new MSP was started.

NETHERLANDS

MARINE SPATIAL PLANNING STEP BY STEP APPROACH

1. Issue identification and assessment

1. Identifying need and establishing authority

a. The failure of the second OWF-round was one of the reasons to develop a new MSP.

b. Authority to plan for a new MSP was established through the creation of the Water Act 2009. Under this Act, existing water related regulations are integrated. The existing spatial planning Act was used as legal basis to undertake spatial actions.

The new MSP for the North Sea is adopted under the National Water Plan (NWP).

c. Authority to arrange MSP was established under existing governmental organizations. DG-Water leaded the project team of IDON to organize and spatially design the MSP.

3. Organizing the process through pre-planning

a. The project team of IDON consists of members from various ministries with responsibility on the North Sea. The project team was supported by external research agencies. Danish North VERITAS was incorporated to perform a study on suitable sea areas for OWF's with respect to shipping.

A work plan was developed by the project team.

b. One of the goals of the new MSP was to delimitate search areas for OWF-development. This would solve the conflicts with other marine uses which arose after the permitting of OWF-projects under the second OWF-round. During the OWF-planning process the shipping-sector was an important stakeholder to consider during the development of the new MSP.

One of the principles, defined in the NWP, is the ecosystem principle. With the use of this principle the government aims to ensure a well scientifically based adoption of measures.

c. For the North Sea, the NWP specifies boundaries and time frames which consist of:
- A base period to provide a common or standard basis for identifying "current" conditions (Step 5) and;
-Target period that defines the period to plan for and to allow to identify "future conditions (Step 6).

The policy for the North Sea policy is further listed in the Policy Document for the North Sea.

2. Preparation of the plan

4. Organizing stakeholder participation

a. The shipping and wind energy representing organization ('s) were involved during the planning process of the OWF-search areas and the additional search areas.

b. Stakeholders were involved during the whole process from delimitating the search areas to indicating the preferred locations for the development of OWF's.

c. During planning, stakeholders were involved by way of bilateral negotiations. During the participative process, undertaken to search for OWF locations within the additional search areas, stakeholders negotiated with the government by handing in their own spatial fission.

5. Defining an analyzing existing conditions

a. Important biological ecological areas are studied and mapped in the Policy Document for the North Sea.

b. Spatial conflicts or compatibilities are studied. MARIN used AIS-data to locate areas with high shipping density.

c. Existing areas of human activities were mapped. The compatibilities between these activities were assed.

6. Defining and analyzing future conditions

a. For the OWF-search areas, future demands for ocean space were made clear by asking the shipping-sector and the OWF sector about future needs. For the shipping-sector this leaded to the use of a safety measure which states that OWF-locations should be located 2 nautical miles from routeing-systems.

   For the planning process of the additional search area, OWF sector and the shipping-sector created their own visions on maps. Each map showed one variant where OWF's should be delimitated when taking into account routeing-systems. Mapping future demands for ocean space.

b. A total of six variants for the delimitation of OWF's were negotiated during stakeholder meetings and workshops. Assessments were performed to gain inside on the suitability of their variants in relation to shipping. Routeing-systems were accounted for by undertaken a Formal Safety Assessment.

c. From the participative process the choice was made for the variant which was developed by the OWF-sector. This choice was not supported by the shipping-sector. The variant was also not used as basis for decision making by the national government.

3. Formal adoption and funding

2. Obtaining financial support

a. ?

b. ?

7. Preparing and approving the spatial management plan

a. Under the NWP, OWF-development would be restricted to four zones which include the OWF-search areas and the additional areas.

   The Spatial Planning Act includes incentives to bind the government on the delimitation of OWF-zones.

   Incentives for the permitting OWF-projects are not jet implemented but still reviewed.

   The NWP includes no measures which state how and when the development should be undertaken.

b. The NWP was drawn up based on the Water Act 2009. Based on the Spatial Planning Act, the zoning plan for the North Sea as adopted under the NWP has the status of a structural vision in terms of spatial planning aspects.

   The zoning plan will be reviewed ones each 10 years.

   No general system of permits and licenses was developed.

   The zoning plan in the NWP was subjected to an SEA.

c. The NWP was approved. The zoning of OWF-development has leaded to the continuation of three OWF-projects which were approved under the second OWF-round.

   No new OWF-projects have been approved until this moment.

4. Implementation

8. Implementing and enforcing the spatial management plan measures

a. The implementation of the NWP leaded not to the permitting of new OWF-projects.

UNITED KINGDOM

MARINE SPATIAL PLANNING STEP BY STEP APPROACH

1. Issue identification and assessment

1. Identifying need and establishing authority

a. Did not define a MSP. In order to permit OWF-development Zone Appraisal and Planning (ZAP)-strategy was created.

b. Did not define a MSP. In order to permit OWF-development Zone Appraisal and Planning (ZAP)-strategy was created.

c. The permitting strategy for OWF-development was arranged by the Crown Estate (CE).

3. Organizing the process through pre-planning

a. The CE has developed the ZAP-strategy. This is the work plan for OWF-development.

b. The goals and objectives are defined by the CE in the ZAP-strategy. The goal of the ZAP-strategy is to ensure that the permitting process for OWF-development is going smoothly.

   The ZAP-strategy rests on the principle of sustainable development.

c. The CE specified the boundaries of the OWF-zones. This was done on basis of information derived from the marine spatial planning (MaRS)-system of the CE.

   With this system the most suitable OWF-zones could be determined. The time frame is defined under the ZAP-strategy.

2. Preparation of the plan

4. Organizing stakeholder participation

a. To achieve a balance, the Crown Estate and DECC recommends that developers of offshore wind farms pro-actively establish effective stakeholder engagement with all interested parties in the navigation sector, at appropriate stages.

b. Stakeholders are therefore involved from initial planning and scoping, throughout the planning process as well as during the construction and operation and decommissioning stage of a project (Multi-way relationship).

c. DECC and the Crown Estate recognize that large scale offshore wind developments has the potential to interfere with navigation safety, and this needs to be assessed carefully prior to determining development consent for individual sites. Here for the MCA is the main party to consult.

5. Defining an analyzing existing conditions

a. The CE has developed the ZAP-strategy. This is the work plan for OWF-development.

b. The goals and objectives are defined by the CE in the ZAP-strategy. The goal of the ZAP-strategy is to ensure that the permitting process for OWF-development is going smoothly.

c. The CE specified the boundaries of the OWF-zones. This was done on basis of information derived from MaRS of the CE. With this system the most suitable OWF-zones could be determined.

The time frame is defined under the ZAP-strategy.

6. Defining and analyzing future conditions

a. Biological ecological areas are mapped. These maps are used in the MaRS.

b. Spatial conflicts and compatibilities were identified with MaRS. MAPS with shipping-data were used to indicate the areas with high shipping densities.

c. With the maps, existing areas of human activities were used to asses if compatibilities occur. Areas were conflicts occur were omitted as far as possible.

3. Formal adoption and funding

2. Obtaining financial support

a. ?

b. ?

7. Preparing and approving the spatial management plan

a. The Crown Estate published the ZAP-strategy, which was formed the start of the third OWF-round. The ZAP-strategy identifies how OWF's can be developed in the nine zones, as indicated by the Crown Estate.

OWF-developers are assisted during the development of a permit by the Crown Estate, which is also 50 % owner of the OWF-project. OWF-developers are responsible to asses and decide if a safety zone should delimitate around the project-area.

b. The ZAP-strategy is not a spatial management plan.

The nine OWF-zones as indicated by the Crown Estate are subjected to a SEA. The SEA is performed by DECC. There is no legal basis for the OWF-zone. Leases are issued by the Crown Estate after the applications have been approved by the Infrastructure Planning Commission.

c. <u>Approving the spatial management plan.</u>
The nine OWF-zones were approved after the SEA. No new institutional arrangement or programs were adopted.

4. Implementation

8. Implementing and enforcing the spatial management plan measures

a. The Crown Estate did map the future demands for ocean space but only for the OWF-sector. They did not ask the marine uses about future needs of space.

b. Did not develop spatial scenarios.

c. Did not selected a preferred spatial scenario.

5. Evaluation

9. Monitoring and evaluating performance

a. Implemented the ZAP-strategy, which was the start of the third OWF-round. The ZAP identifies how OWF's can be developed in the nine oversized zones, as indicated by the CE.

OWF-developers are assisted during the development of a permit by the CE, which is also 50 % owner of the OWF-project. OWF-developers are responsible to asses and decide if a safety zone should be delimitated around the project-area.

b. Did not develop a spatial management plan. The nine OWF-zones as indicated by the CE are subjected to a SEA.

The SEA is performed by DECC. There is no legal basis for the OWF-zone. Leases are issued by the CE after the applications have been approved by the Infrastructure Planning Commission.

c. The nine OWF-zones were approved after the SEA. No new institutional arrangement or programs were adopted.

10. Adopting the spatial management process

a. The Crown Estate uses the OWF-zones as boundaries for their permitting area. The ZAP-strategy is the guide for the OWF-developers in order to get through the permitting procedure.

b. 50 % of the developments in the zone are financed by the Crown Estate. They ensure that during the application development process the OWF-developers comply with the ZAP-strategy.

c. The OWF-developers are enforced to assess the compatibilities with other human activities. In order to assess the effects on shipping the developers have to conduct a Navigation Risk Assessment as part of the Environmental Statement. This Navigational Risk Assessment consists of a Formal Safety Assessment. Guidance has been given by the Maritime Coast Guard Agency. The purpose of the Navigational Risk Assessment is to demonstrate to the MCA that the hindrance does not increase the risk for shipping to an intolerable level.