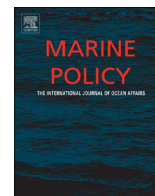




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Biodiversity offsets for offshore wind farm projects: The current situation in Europe



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ABSTRACT

The European Union's energy policy aims to increase the proportion of energy derived from renewable sources in Europe. Marine renewable energy, offshore wind energy especially, contributes to the renewable energy mix. Offshore wind farms appear to be clean, and are supported by governments and NGOs as a way to reduce the use of conventional energy resources and thus decrease greenhouse gas emissions. However, developing infrastructure in marine areas can impact marine ecosystems. European directives ask offshore wind farm developers to carry out an Environmental Impact Assessment (EIA) including a mitigation hierarchy, i.e. envisaging measures that would avoid, reduce, and if possible offset significant adverse effects on ecosystems and human activities. This paper reviews EIA reports from seven European countries and is focused on impacts on the open water marine environment. According to the reports, measures have been taken for avoiding and reducing impacts, so there should be no significant negative residual impacts and hence no need of offsets. But the mitigation hierarchy for ecological impacts seems to have been incompletely implemented, because it is unlikely that there are no significant residual impacts. The paper proposes some technical and ecological explanations, followed by some governance and social explanations, for the absence of biodiversity offsets.

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1. Introduction

Directive 2009/28/EC¹ on renewable energy, signed by Member States of the EU in December 2010, sets a target of a 20% share of energy from renewable sources by 2020. Among types of marine renewable energy, cumulative offshore wind power capacity progressed from 0 MW in 1990 to 4995 MW at the end of 2012, and is targeted to reach more than 32,200 MW in 2020 [1]. This policy is strongly supported by governments and NGOs in order to reduce the use of conventional energy resources, thus decreasing greenhouse gas emissions to satisfy Kyoto protocol targets. Construction efforts are still needed and the amount of investment needed to reach this goal is clearly a challenge for the future.

At the same time, the exploration, construction, production, and decommissioning of infrastructures in marine areas all have temporary or permanent negative impacts on marine ecosystems: destruction of seabeds, disturbance of fish populations and marine

mammals, collisions with seabirds or degradation of natural landscapes, for example. Studies and reports describing the impacts of offshore wind farms on the environment are numerous. The following is a brief review of the main ones. A much-cited grey literature report [2] deals with the Horns Rev and Nysted farms, which were the biggest until 2010 (Appendix A). Three other well-known documents, two co-produced by Danish developers and the state of Denmark ([3] and its update [4]) and the other by the Danish Energy Authority alone [5], present general information on the impacts of offshore wind farm projects on natural environment. During the 2009–2012 period, reports were produced by the Royal Belgian Institute of Natural Sciences (RBINS) and the Management Unit of the North Sea Mathematical Models (MUMM) about offshore wind farms in the Belgian part of the North Sea [6–9]. Under the Sixth Framework Program (2002–2006), the European Commission financed the Concerted Action for Offshore Wind Energy Deployment and published a description of the current state of offshore wind energy in Europe, dealing with environmental issues among other things [10–13]. In 2010 the IUCN published a report called “Greening Blue Energy: Identifying and managing the biodiversity risks and opportunities of off shore renewable energy” [14]. A great deal of the scientific literature deals with specific environmental impacts or phases of the project; these are not cited in this paper. Some of them have

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¹ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

offered a more general review of the impacts of marine renewable energies, e.g. [15–17], or of offshore wind farms, e.g. [18–20] based on the relevant scientific literature.

The legal framework dealing with the environmental impact of offshore wind farms is the Environmental Impact Assessment (EIA) process (Section 3.1). It requires developers to produce an EIA report outlining measures that would avoid, reduce and, if possible, offset significant adverse effects. In other words, they have to follow a mitigation hierarchy.

In 2003, Kristina Rundcrantz and Erik Skärbäck wrote an article about the EIA in several European countries, noting that “If compensation measures are proposed, described and analyzed in a good way in the EIA this will probably make it easier for the measures to be implemented in the project” [21]. What is the situation now, ten years later?

Unfortunately, none of the documents cited above have covered in detail the information available in the EIA reports for offshore wind farms. Apparently, no recent article describes how the marine environment and biodiversity in open water are currently taken into account in European offshore wind farm development, nor how the mitigation hierarchy is being implemented. Feedback from countries where these projects began more than twenty years ago, with the Vindeby offshore wind farm built in Denmark in 1991, would be useful for other countries that expect soon to develop offshore wind farms. Today, offshore wind farms are only deployed in Northern European countries. This paper reviews the legal framework and the measures for avoiding or reducing the impact on marine ecosystems that have been proposed in the EIA reports. The discussion focuses on some measures that have been presented as biodiversity offsets and proposes a possible explanation of the absence of marine biodiversity offsets in open water.

Lastly, it is important to define precisely the concept of “biodiversity offset”. The definition used in this paper is: “Biodiversity offsets [are] conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure no net loss of biodiversity. Before developers contemplate offsets, they should have first sought to avoid and minimise harm to biodiversity” [22]. The term “compensatory measure” or “compensation measure” is often used. “Biodiversity offsets” corresponds to “ecological compensatory/compensation measures”; “mitigation” is a more general term that includes all the steps of the mitigation hierarchy (avoid, reduce, offset).

2. Materials and methods

The information sources on offshore marine renewable energy mainly used here are: the European Wind Energy Association, the various national Wind Energy Associations, and the websites Thewindpower.com and 4coffshore.com; additional data have been collected from each wind farm website. This paper presents an outline of the current situation as of August 2013.

2.1. Choice of sample

Usually marine renewable energy projects are divided into those “accepted,” “planned,” “under construction,” and “in production.” All the selected offshore wind farms for this paper are European fixed-bottom wind farms “in production” or “under construction”. The farms for which construction has not yet begun (some “under construction,” “planned,” and “accepted”) have not been selected because claims against the projects and construction delays may still prevent actual construction.

Table 1

Number of fixed-bottom offshore wind farms in production and under construction in the European Union, by country, as of August 1st 2013.

Country	Number of farms	
	In production	Under construction
UK	15	4
Denmark	10	0
Sweden	4	1
Germany	2	8
Belgium	3	2
Netherlands	2	0
Ireland	1	0
Total	37	15

Some wind farms were considered as not relevant for this study for the three following reasons:

- Size: for small demonstration farms with fewer than 4 turbines the EIA process is almost never mandatory.
- Location: some nearshore farms can be considered as onshore because they are installed on artificial islands and often linked to the mainland by spits of land or bridges (e.g. the Rønland wind farm in Denmark). Some are installed in terrestrial areas or areas other than the open sea, such as freshwater lakes, estuaries, and harbors (e.g. the Irene Vorrink wind farm in The Netherlands).
- Technology: floating wind farms were not included because they are still at the prototype stage.

This left 52 fixed-bottom wind farms for study. On August 1st 2013, 37 farms are in production in Europe and 15 more are under construction (Table 1).

2.2. Data collected

2.2.1. Legal framework and obligations in Europe

Information has been gathered on how Member States have transposed and enforced the EIA directive for offshore wind farms, and on national laws (where these exist) covering offshore wind farms and the mitigation hierarchy. The main source used for information on national legal frameworks is the European Commission website. Members of the EIA/SEA Expert Group of the European Commission have been contacted. The paper mainly focuses on the transposition of the EIA Directive into national law, and does not describe the complete administrative and legal framework for offshore wind farms.

2.2.2. Description of potential impacts on marine ecosystems and related mitigation measures in EIA reports

Studying the EIA reports appeared to be the most appropriate and effective way to collect information about the measures for avoiding, reducing, or offsetting impacts. According to EU legislation, the EIA reports have to be made available in the public domain. In some countries such as the UK, Denmark, and Belgium the main sections of the EIA reports were readily accessible on the websites of wind farm projects, government institutions, and local authorities. In contrast, countries such as Germany and Sweden do not put all their EIA reports online. In this case, requests were sent to researchers working on these topics, wind farm developer employees, and government employees. Different languages are used in these reports, although many recent ones have at least a summary of the EIA or a non-technical summary translated into British English. Only one developer with an EIA report refused to share it.

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