POWER - Offshore Wind Energy in the North Sea Region

Executive Summary

Faculty of Spatial Sciences
University of Groningen

A Report about the state of affairs of offshore wind energy projects, national policies and economic, environmental and technological conditions in Denmark, Germany, The Netherlands, Belgium and the United Kingdom.
edited by Sjoerd Zeelenberg,
University of Groningen, September 2005.

Introduction

The partners of work package 1 – planning and participation have established a quick scan, describing country-specific regulations, problems and bottlenecks for offshore wind energy in the North Sea Region. The result, the report Offshore Wind Energy in the North Sea Region, serves as a base line survey for all POWER activities. It has been edited and coordinated by the University of Groningen, and was published on 1 September 2005. These papers contain the Executive Summary of the report.

In Europe as well as in the individual member states, the use of renewable energy resources has gained major importance. The Kyoto protocol, the Lisbon agenda and several EU Directives emphasise the shared conviction that a change in energy consumption and production is desirable, and in the end unavoidable. Offshore wind energy can play an important role in this. Though, the deployment of the offshore potential poses several serious challenges.

1. Offshore Experiences

The planning, construction and deployment as well as the operation of offshore wind farms pose new questions and challenges to both government and industries. Knowledge and experience on offshore activities are rapidly growing, as experiences in Denmark and the United Kingdom provide many answers and useful insights. The capacity and efficiency of offshore wind turbines have increased considerably. The reliability of offshore wind farms and the predictability of their production are improving.

Given this technical progress, offshore wind energy can become a competitive and reliable energy source. Substantial investments by concerns like Siemens, Vestas, Shell or General Electric, confirm the economic potential of the offshore wind energy sector. As a consequence, targets and objectives are revised. Recently, the European Wind Energy Association has adjusted its targets for offshore wind energy to 10 GW for 2010 and 70 GW for 2020[1].

[1] EWEA (2003) Special Newsletter, European Wind Energy Conference (EWEC), Madrid 18th June 2003

Table 1: Overview of offshore capacities in the North Sea. Commissioning of the wind farms is foreseen for the period 2000-2008.

	Installed	Planned or under construction
Denmark	423 MW	400 MW
Germany		2,2 GW
The Netherlands		220 MW
Belgium		216-300 MW
United Kingdom	80 MW	650 MW (round 1), 6 GW (round 2)

Table 1 shows present and planned offshore projects, limited to the five countries participating in POWER; ambitions are set high, and considerable efforts need to be done. The planned capacity in the second column is to be understood not so much as long-term policy goals, but rather as projects that are likely to be realised within the upcoming years.

Despite the fact that the countries share the belief in the benefits of offshore wind energy, there is a diverse range of attempts, successes and failures in its development. Local and national circumstances have been determinative in the technical, societal, financial, environmental and political process towards the actual erection and deployment of wind turbines, both on- and offshore. The study addresses five issues that are of high importance in this respect.

2. Planning Practices

The planning and building of offshore wind farms have proven to be subject to complex and complicated processes. Regarding possible locations for offshore wind farms, The Netherlands and Belgium do not explicitly designate preferred areas, contrary to Germany, the UK and Denmark. The Netherlands and Belgium exclude several areas reserved for other uses (e.g. excavation, shipping routes, Habitat or Birds Directive) whereas Denmark and the UK have done Strategic Environmental Assessments (SEAs) in order to designate suitable areas for offshore wind activities. Current developments in The Netherlands – in the last half year 78 proposals were submitted – might well lead to an increasing interest in a more pro-active approach by the government.

Although one could question the actual relevance of the difference between exclusion-based policies and designating policies, it illustrates the governments' attitude towards offshore wind energy. The progressive and unambiguous approach and its results in both Denmark and the UK cannot be denied. On the other hand, the somewhat fragmented and uncoordinated planning regulations and attempts in Germany have resulted in the absence of a clear view on both the North and Baltic Sea. Amelioration of this situation is expected, but for now it remains a fine example of the mismatch of government arrangements and policies. It illustrates the importance of an adequate steering philosophy of the governments. As comparable juridical conditions apply in the 5 countries, table 2 can be drawn.

From a planning perspective, Germany shows a rather remarkable situation. In the 12 nm zone, spatial competencies are distributed among the *Länder*. Permits have to be obtained from several sector based authorities. However, the EEZ is the domain of Federal Maritime and Hydrographic Agency that grants the approvals and permits. Especially within the 12 nm zone, the combination of fragmented regional planning regimes and sector-based approaches results in rather disconnected requirements and conditions for the application of offshore wind farms.

Table 2: Site conditions for offshore wind farms in the North Sea[2].

	Territorial waters	EEZ	Applications outside preferred areas
Denmark	SEA designated 5 areas.	Allowed, no site conditions.	Extra costs for grid connection.
Germany	Allowed. Two built and two projects underway.	Yes, SEA and spatial planning ahead.	Allowed, but no guaranteed price if licensed after 01.01.2005.
The Netherlands	Not allowed. Except the NSW pilot project.	Allowed, no preferred areas.	No preferred areas
Belgium	Not allowed.	Allowed.	Former applications have been refused.
UK	Allowed, few projects underway.	SEA carried out. 3 preferred areas.	Only under exceptional conditions.

By means of the Integral Management Plan North Sea 2015 planning and coordination of activities on the Dutch part of the North Sea are guided by a new framework. This unique framework provides a spatial outlook, in which current and future uses are accommodated. Specific attention is paid to areas of high ecological quality, and the restrictions that apply. Besides, the plan aims at reducing administrative complexity by presenting a so-called Management Platform. In this platform, management, licensing, maintenance and safety issues will be regulated. The offshore wind energy sector can potentially benefit from these kinds of incentives. The fact that in the IMPNS 2015 no preferred areas are designated, might delay decision-making. Whether that is the case, remains to be seen in future.

3. Environmental Impact

Several Member States have taken a rather careful approach with relatively few pilot wind farm developments and proposals. This approach provided the opportunity of a feedback of information and experiences. Meanwhile, the UK already has a considerable number of relatively small scale wind farm developments planned for which the Environmental Impact Assessments (EIAs) have been assessed individually. Despite different approaches, the problems identified in both EIAs and Strategic Environmental Assessments (SEAs) for offshore activities have been very similar for the five countries.

There seems to be insufficient knowledge of how to integrate all the positive environmental impacts of offshore wind energy properly in the requirements for appropriate assessment. If this would be integrated in the assessments, it might reduce restraints on offshore wind energy development. There is also indistinctness on the breadth of required studies concerning adverse impacts on nature reserves in the marine environment, including safety issues. Without a clear outline on how to address the legal and organisational aspects of environmental issues (including safety) in relation to planning and implementing offshore wind energy, it is rather difficult for a project developer to allow strategic decisions to be made.

[2] This table is partially derived from Ministry of Economic Affairs and COD (2004) Development of offshore wind energy in Europe, policy workshop background document, 30th September and 1st October 2004, Egmond aan Zee, p. 28.

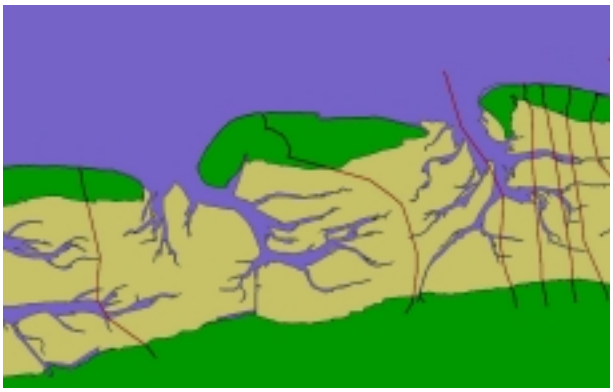
Recently, members of work package 1 have contacted COD (Concerted action for wind energy deployment). Previous experiences and the current agenda of COD[3] are closely related to environmental issues concerning offshore wind energy. Possible information exchange or collaboration will strengthen both research agendas.

4. Grid Issues

Problems of grid connection are closely related to planning practises and environmental issues. In Belgium, the risk of the low capacity of the current grid is commonly known. Major investments will have to be done when the development of offshore wind farms really takes off. Agreements on the distribution of the costs have not been made to date, which poses crucial problems in the near future. Both planned wind farms in The Netherlands will be connected to Corus, a major steel manufacturer; a both creative and practical solution. A recent study has determined that the Corus site and the Maasvlakte (Port of Rotterdam) are the most likely to be used for future wind farms. It clearly shows how determinative the condition of the electricity grid can be.

In the UK, the Greater Wash projects (one of the designated areas) will face a challenge to establish a grid connection point. Both solution and funding are still unknown. Besides the condition of the grid, planning and licensing of cable routes can thwart progress. In the German case, the 'grid situation' is closely related to problems mentioned earlier. The *Länder* firmly object to proposed cable routes and grid connections, arguing that the environmental qualities of the coastal areas are significantly affected. In Lower Saxony one single cable route for all wind farms is insisted upon. This causes serious delay and poses technical problems. As a consequence, the feasibility of the current proposals might need to be reconsidered. The behaviour of the *Länder* seems rather paradoxical, as the allocation of onshore wind farms does not encounter comparable opposition. The German case clearly shows the conflicting interests between different government levels, as regulations of the *Länder* seem to thwart projects that are already consented at a higher level. The same goes for the Dutch experiences, where environmental permits on land turned out to cause a major delay.

Picture 1: Examples of cable routes for the German Bight.



The electricity grid and grid connection could be important issues regarding the development of offshore wind energy. It needs no explanation that the location of possible grid connections on land can be highly determining for offshore initiatives. The funding of possible upgrades in the grid is of major importance to this discussion. Denmark already uses these costs as an instrument to influence location choice of applicants; the grid connection of wind farms outside the preferred areas is partially to be paid for by the developer of the wind farm. In the other countries, the grid connection costs are financed by the wind farm developer, whilst the reinforcement of the existing grid is funded by the grid owner. An international perspective on these issues might provide suitable responses.

[3] See www.offshorewindenergy.org.

The handling of new applications on a case by case basis might lead to insufficient attention to cumulative aspects of offshore wind farms. Here, we should think of not only grid connection, but also cumulative environmental impacts, use of cable routes and the effect on fishery industry. A case by case approach might decrease financial, administrative, technological and ecological efficiency. Therefore, the experiences in the UK and Denmark can be highly important in the course of POWER.

5. Economic Conditions

It is generally accepted that public support is needed to stimulate the development of renewable, and offshore wind energy in particular. Financial and fiscal incentives are the most common means to do so. Table 3 provides an overview; it should be kept in mind, though, that Belgian regulations are being revised and rather unsure for now.

Table 3: Policy instruments to stimulate offshore wind energy[4].

	Investment subsidies	Fiscal incentives	Feed-in tariffs	Renewable obligation/ green certificates
Denmark	X	X	X	
Germany		X (cheap loans)	X	
The Netherlands	(X)	X	X	
Belgium		X	X	X
UK	(X)	X		X

In the case of The Netherlands and Denmark, investment subsidies are provided in exchange for extensive monitoring and research programmes, focussing on environmental consequences of offshore wind farms. The investment subsidies in the UK have only been provided for the first round projects. The German and UK case show that it is possible to agree upon lower guaranteed prices (UK) or decreasing prices when long-term contracts are arranged (Germany). This should be interpreted as a sign that energy suppliers have a rather confident attitude towards the development of offshore wind energy. The main importance here is to make sure that offshore energy can cope with starting problems on the energy market, in order to get a stable position and to be competitive.

6. Stakeholders

Generally spoken, the distribution of knowledge, power and instruments among parties are major conditions and characteristics of planning processes. In order to guide and ameliorate decision making, an insight to this distribution is crucial, as well as effective means to intervene in this process. The discussions on both offshore activities and renewable energy are provided with complex, diverse and opposite interests and motives.

Regarding offshore wind energy, it is essential to be able to cope with this situation in an effective manner. The Middelgrunden project is a fine example; local citizens have participated extensively in the decision making process, resulting in common interests

[4] This table is partially derived from www.worldwidegreen.com/europe.htm, last visited 29th January 2005.

and efforts. The Information Centre at Scroby Sands (UK) and the expected positive effects show how offshore wind farms and regional development can provide mutual benefits. Regarding offshore developments, private parties and (national) authorities depend on each other, as knowledge, competencies and (financial) means are dispersed. In the course of work package 1, elaborating on the stakeholder structure as provided in the quick scans will be of great value for the eventual design of the Decision Support System (DSS), and this can be used to work on the proposed guidelines.

7. Conclusions

In the previous five sections, some of the main challenges of offshore wind energy have been mentioned. If they have one common characteristic, it will be their diversity: diversity on the content, as well as their impact and character per country. The rapidly growing attention, from government, non-government parties and society has resulted in various attempts to give direction to developments of offshore wind farms. International comparison and analysis will be of great value to coping with these problems and providing nation-specific recommendations.

The full report is available for download on the POWER website at www.offshore-power.net

Contact for "Offshore Wind Energy in the North Sea Region" study:

For questions regarding the compilation of the
document, the reader may turn to the University of Groningen:
Sjoerd Zeelenberg
E: s.zeelenberg@rug.nl, Tel: +31 (0)50 363 3885

ICBM, University of Oldenburg, as work package responsible
is able to answer questions on the upcoming steps and developments of the work package:
Susanne Adam
E: adam@icbm.de, Tel: +49 (0)441 798 3623