Workshop on
"Planning offshore windfarms in line with Natura 2000 requirements: legal frame, impacts, investigation standards and procedures"

29-30 May 2008 in Sigulda, Latvia

Report

Goals of the workshop:

- To discuss the current situation, problems and needs concerning planning and impact assessment of offshore wind farms in the Baltic States,
- To learn from experiences of other countries (Germany, Denmark, Sweden, Netherlands) with the aim to avoid negative impacts of this new economic activity on nature values in the Eastern Baltic Sea.

Opening and introduction

Heidrun Fammler, BEF

Ms. Fammler gave a brief overview of the situation and problems regarding planning offshore[1] windfarms in the Baltic States to explain the reasons for organising this workshop. She introduced the goals and agenda of the workshop.

SESSION I: Current situation with regard to legal framework and planned offshore windfarm projects in the Baltic States

Offshore wind energy in Latvia

Raimonds Kašs, Ministry of the Environment & Edgars Bojars, BEF, Latvia

Mr. Bojars gave an overview on general situation regarding wind energy and marine protected areas in Latvia, relevant legislation and the main problems as well as proposed potential solutions for the problems.

Currently, there is 26,8 MW wind power installed in Latvia. There are no offshore wind farms yet but interest from three companies. The main problem is unclear ownership of Latvian territorial waters and EEZ. There are also no clear procedures and no responsible authorities set for getting necessary permits for offshore installations either no regulations on technical requirements. Also the questions related to purchase price and terms and balancing fluctuations of wind energy are not solved yet.
A ministerial working group is established to solve administration of the territorial sea and EEZ.
Five potential windfarm interest areas are submitted within the project application of BEF-Latvia "Offshore wind parks for Latvia – potentials for sites and evaluation of impacts", which is currently being evaluated. One of those areas is overlapping with a potential marine protected area.

The proposed legal solutions include development of necessary legislation, fixing state minimal purchase price for electricity for a certain period, hiring experts on international maritime legislation, fixing national borders at sea. Also studies of offshore nature values, wind energy potential and best technical solutions (including design of turbines, power grid, energy storage possibilities) would be needed.

Discussion:

[1] In the Baltic States the term "offshore" is used not only for the Exclusive Economic Zone but also for the territorial sea (e.g. for wind farms located in the sea and for protected areas that are not connected to the coast).

- Windfarm applications are partly in the territorial sea and partly in EEZ (50:50). There is agreement with developers that the interest areas are at first explored regarding nature values and there will be no windfarms built in Natura 2000 sites.
- The first step should be political decision if offshore wind energy is needed for Latvia, then further steps can be planned (e.g. SEA for potential offshore windfarm locations).
- Increase of electricity price stopped in 2002, therefore no new windfarms have been built in Latvia after 2002.
- Proposed windfarm locations are shallow places that are outside of Natura 2000 sites.
- Connection to the grid is currently problematic due to poor legislation. The developer should build a new electricity grid because old system has not enough capacity. Hopefully in the next 5 years investigation about grid will be carried out and problems solved.

Planning of offshore wind farms in Lithuania
Miglė Masaitytė, Ministry of Environment, Lithuania
Ms. Masaityte gave an overview about Lithuanian legal framework and procedures related to planning of offshore windfarms, introduced the first offshore windfarm project as well as highlighted potential conflicts with nature conservation and informed about planned next steps in Lithuania.

The main legal acts to be taken into account are laws on EIA, territorial planning and construction. According to the Law on EIA, the screening procedure is required for windfarms but it is also possible to start EIA without screening procedure. The competent authority assessing EIA is Klaipeda REPD. For establishing offshore windfarms a special territorial planning document as well as a detailed plan are needed. Also technical design documentation has to be prepared and approved.
In Lithuania the territorial waters belong to the state. Responsible authorities are not clear. Currently, one offshore windfarm project has started and EIA is going on. However, local municipalities are against it.
Potential conflicts with Natura 2000 are in areas that are not yet protected due to lack of biological information. The Law on Protected Areas forbidds to build windfarms in Natura 2000 sites but it is very difficult to forbid it in areas that are not protected.
The planned next steps include reviewing legislation regulating territorial planning and construction processes, and clarifying responsible authorities.

Discussion:
- In Lithuania a detailed assessment of territorial waters has been made in frame of a project to find places for offshore windfarms where there would be no conflicts with other uses of the sea. However, birds were not considered due to lack of data.
- The Baltic States have to start investigations to define potential sites for windfarms. Then the developers can pay for further investigations. Bird issue needs to be taken seriously because it is the biggest risk potential. Alternatives have to be assessed, also at the coast and further in EEZ. EIA has to be done carefully, otherwise NGOs can take it to the European Court, which means a risk to loose a lot of money.

Current situation with regard to legal framework and planned offshore windfarm projects in Estonia
Dagmar Heringas & Irma Pakkonen, Ministry of the Environment, Estonia;
Eero Saava, Eesti Energia, Estonia;
Veljo Volke, State Nature Conservation Centre, Estonia
Ms. Heringas gave an overview on current situation regarding legal framework and planning offshore windfarms in Estonia; Mr. Saava continued with introducing the plans of Eesti Energia, and Mr. Volke highlighted potential problems from nature conservation point of view.

Ms. Heringas admitted that there are many gaps to fill concerning the legal framework regulating the use of the seafloor. The process has started with amending the Ports Act (it also comprises adjustments in other laws like Planning Act, Building Act, etc.).
According to the EU Blue Book, the Commission recommends Member States to draw up maritime policies and marine spatial plans. Currently, negotiations are going on, which Ministry should coordinate development of maritime strategy in Estonia.
So far, three developers have applied for water permit to build offshore windfarms - Nelja Energia, Neugrund and Eesti Energia.

Mr. Saava informed that as the oil shale energy use has to be decreased (because of high CO2 emissions), the state-owned company Eesti Energia has formed research groups on nuclear and renewable energy. Offshore wind energy will be important source of renewable energy in Estonia. Eesti Energia has selected potential places for offshore windfarms based on depth (less than 40 m) and location outside of Natura 2000 areas. Those areas will be investigated further regarding wind resource, environmental impacts etc.
As the total energy consuming in Estonia is in summer ca 400 MW and in winter maximum 1,4 GW then the main aim of offshore windfarms would be export of electricity. Eesti Energia plans to install 1 GW offshore wind energy by 2025.

Mr. Volke highlighted that although Estonia has designated quite many Natura 2000 sites in the coastal sea, there is still lack of data about offshore areas where sites have to be designated as well. The interest of wind energy developers is high but response of the state is not so quick. Nature conservationists are worried that there can be negative impacts on biodiversity, the pre-assessment studies financed by developers might have poor study design and might not be able to detect nature conservation values.
The solution would be strategic approach: carry out inventories of the whole marine territory, designate Natura 2000 sites, develop national wind energy strategy.

Discussion:
- Process of inventories is going on quite fast at the moment in marine areas of Estonia. New sites will be proposed in frame of the ESTMAR project, first results will be communicated as soon as possible.
- Legislation for constructions in the sea is currently missing in Estonia but Ministry of Economy will be probably the permitting authority (for building permit).
- Half-diving construction of wind generators would be solution to go into deeper areas where there would be no problems regarding impact on birds.
- Member States should not expect detailed action plan from the European Commission on maritime strategy and spatial planning but start developing own national maritime strategies and take political decisions. There will be only rough guidelines and definitions of terms because the situation in countries is different and therefore there cannot be one binding document for the whole EU.
- It was concluded that EIA procedures are clear in all Baltic States but there is lack of specific procedures, guidelines regarding offshore windfarms.

SESSION II: Experience from other EU countries: current situation regarding offshore windfarms, legal framework and procedures, marine spatial planning

Overview of the situation in Sweden

Ebbe Adolfsson, Swedish Environmental Protection Agency
Mr. Adolfsson gave an overview on current status regarding windfarms and relevant legal framework in Sweden as well as introduced preliminary results of the research programme "Vindval" on impacts of windfarms on people and biodiversity.

Currently there is almost 800 MW wind generators installed in Sweden. The only existing marine windfarms are in Kalmarsund and Öresund (at Lillgrund 50 generators).
A survey of 22 offshore banks has been carried out (financed by SEPA) and as result seven banks have been identified as valuable from nature conservation point of view.
Sweden has set the planning target of 10 TWh/y electricity from wind energy by 2015 and 30 TWh/y by 2020 (including 10 TWh/y from offshore windfarms). Many big companies in Sweden are interested in building windfarms but mainly on land, which is more profitable than building into the sea. Areas of national interest for wind power are defined and there is support for renewable energy.
Permits for offshore windfarms are given by the Environmental Court and several agencies are involved in the process. Environmental Code sets general rules, including areas of national interest (from ecology as well as energy production point of view). In general, within 100 m both sides of the coastline it is not allowed to build windfarms. According to Plan and Building Act, every municipality must have a comprehensive plan. Municipalities can get economic support (2007-2008) to make a thematic wind energy plan under the comprehensive plan. Also detailed plan is required for building a windfarm if it is likely to have significant environmental effects.
The goal of the impact study programme "Vindval" is to support building of windfarms. Impacts on people (noise), marine biodiversity, birds and bats are studied. Information about Vindval project can be found at www.naturvardsverket.se/vindval (mostly in Swedish).
Reports in English:

- Results from 2005 – 2007 within the Vindval research programme http://www.naturvardsverket.se/Documents/publikationer/620-8329-8.pdf;
- Bats and offshore wind turbines studied in southern Scandinavia http://www.naturvardsverket.se/Documents/publikationer/620-5571-2.pdf

Discussion:

- For installing wind energy up to 1 MW offshore and up to 25 MW on land, no permits from environmental authorities are needed but notification to municipality is required. If they are not against, the building can start.
- In the EEZ the government gives permits, the procedure is more unclear.

Overview of the situation in Denmark
Jesper Kyed Larsen, Vattenfall, Denmark
Steffen Nielsen & Mette Cramer Buch, Danish Energy Authority
Mr. Larsen gave an overview on the situation in Denmark regarding offshore wind energy based on input from the Danish Energy Authority.

The first offshore windfarm in Denmark was built in 1991. The first action plan on offshore wind power was prepared in 1997 and is currently being revised. The first large-scale windfarms Horns Rev and Nysted were built in 2002-2003. The current installed capacity offshore is 423 MW but tenders for 800 more MW to be established in 2009-2012 are already decided.
The single competent authority responsible for planning of windfarm development, tendering of pre-selected sites and giving necessary licences is Danish Energy Authority. A separate institution is responsible for the grid connection.
Developers can also propose other locations for windfarms than pre-selected sites but this is not practiced usually. Developer has to do own studies for the tender, to show that he can produce energy at lowest costs.
Pre-assessment is done by the government to define areas with least conflicts.
A commity consisting of different institutions was formed to plan future offshore wind farm locations. All interests were mapped, logistics and costs assessed. As result 23 sites were proposed for windfarms with the total capacity of 4600 MW (which is equivalent to 50% of Danish electricity demand). The report was published in April 2007, public hearing has taken

place and currently work on comments is going on. Information on offshore wind energy in Denmark is available at http://www.ens.dk/sw15562.asp.
Denmark has had demonstration projects in Horns Rev and Nysted. Demonstration approach has been successful and also accepted by the public.

Discussion:

- SEA was done for 23 proposed sites according to EU requirements. Technical issues are bigger problem than environmental.
- The winner of the tender has to build the windfarm in a given time. 50000 full-load hours will be bought from him with the agreed price, afterwards according to market conditions. The grid operator provides connection.
- The wind speed should be at least 8-10 m/s in pre-selected places.

Experience from the Netherlands
Jakob Asjes, Institute for Marine Resources & Ecosystem Studies, Netherlands
Mr. Asjes provided an overview on current situation, policy and legislation concerning offshore windfarms in the Netherlands as well as described the general mandatory topics in EIA for offshore windfarms.

Currently there are two offshore windfarms on the Dutch continental shelf:
Egmond aan Zee in territorial waters – a demonstration project subsidized by the Dutch government (36 turbines, 108 MW, operating since April 2007);
Q7 in the EEZ – 60 turbines, 120 MW, in operation since March 2008.
Dutch policy plans include installing 6000 MW wind generators into the Dutch part of the North Sea by 2020. According to the rules, the maximum area of a windfarm can be 50 km² and no new windfarms are planned in the territorial sea.
Permits for offshore windfarms are issued by the Ministry of Transport, Public Works and Water Management who has to consult also with other ministries.
EIA is a desk study based on best available information. Monitoring and Evaluation Programme (MEP) is obligatory and extra mitigation measures can be required based on results of MEP.
There is lot of applications from different countries (77 EIAs for ca 35 locations are going on) but subsidies are available only for 700 MW. Building of the windfarm has to be started in 3 years after getting the permit.
EIA should assess impacts on birds, fish, marine mammals, benthos, morphology and hydrology as well as impacts on shipping safety, air traffic, military radars, other human use, landscape and archeology (ship wrecks). Detailed EIA guidelines are available (in Dutch). More information is available at
http://www.noordzeeloket.nl/activiteiten/windenergie/algemeen/ but only in Dutch.
Every developer must assess also cumulative impacts but it is a difficult task because the thresholds are not known.
Places for windfarms were selected based on mapped human uses on the Dutch continental shelf but no ecological criteria were used. There are no Natura 2000 sites designated in the Dutch EEZ yet, site selection process is going on.
Mr. Asjes concluded that for planning offshore windfarms marine spatial planning and SEA are needed and thresholds for cumulative impacts of offshore windfarms on ecosystem need further discussion.

Discussion:

- Quality of EIA is checked by an independent organisation. The developer who has approved EIA and necessary documentation ready first, gets the building permit.
- A separate organisation is responsible for the grid. The current grid is not suitable for more windfarms and this problem still has to be solved.
- None of planned windfarm locations are in vicinity of Natura 2000 areas.

- In Germany it was decided that investigations are needed also for SEA because existing data might be not enough to fulfill EU directives.
- There is a reasonable coverage of baseline data available (paid by the Dutch government) that developers can use for EIA.
- Impacts on migratory birds, passerines are assessed based on existing information on migration routes and results from other examples like Horns Rev.

Provisions for offshore windfarms in Germany

Anne Barbara Walter, Federal Environment Agency, Germany

Ms. Walter introduced the competencies in the territorial sea and EEZ of Germany, and gave an overview on legal framework regarding spatial planning, licencing procedures and power line connections for offshore windfarms.

In Germany windfarms in a distance of 3 or more sea miles from the coastline are classified as offshore windfarms. The development of wind energy in Germany is concentrated in the EEZ. By 2025/2030 ca 15% of daily electricity supply is planned to come from wind energy. Federal states are responsible for the territorial sea and the Federal government for the EEZ. The states have made spatial plans for the territorial sea. Development of the spatial plan for the EEZ is ongoing (made by the Federal Maritime and Hydrographic Agency - BSH). This plan includes preferred areas for windfarms where windfarm development is subsidized. Spatial plans in Germany are usually of a binding nature, so windfarm projects have to correspond to them.
The permit for establishing an offshore windfarm is given by the relevant Federal State in the territorial waters (according to the Federal Immission Control Act) and by BSH in the EEZ (according to the Maritime Facilities Ordinance). The permit in the territorial waters has concentration effect (includes all necessary permissions) but not in the EEZ (several permits from different agencies are needed).
If more than 20 generators are planned in the EEZ then EIA is obligatory.
For power line connections further permissions are needed and different legal acts have to be considered (Maritime Facilities Ordinance; Federal Mining, Building and Water Laws; Federal States' spatial plans, Water and Nature Conservation Acts; Federal Waterway Act; Law of Embankment).

Offshore wind energy in Germany

Nico Nolte, Federal Maritime and Hydrographic Agency (BSH), Germany

Mr. Nolte gave an overview on approval process for offshore windfarms and the current status regarding planned windfarms in the German EEZ.

There is a very strong political commitment to offshore wind energy in Germany: the aim is to install 25 000 MW by 2020. Renewble Energy Act sets obligation to buy renewable energy (the more far from the coast, the higher price is paid).
In the Baltic Sea the German EEZ is very small but there are very many interests/uses – a spatial plan is currently being prepared.
A windfarm project application can be rejected only for two reasons: if it is impairing shipping safety or has significant impacts on marine environment.
The duration of the process until getting the permit is 2-3 years and it includes 3 rounds of participation at different levels. EIA has to be based on field investigations carried out at least during 1 year. The post-construction monitoring programme has to be planned at least for 3 years.
Currently there are 52 windfarm applications in the German EEZ, 7 of them in the Baltic Sea. Additionally there are 14 applications for power cables (2 of them in the Baltic Sea). The cables must be built by the grid owner.
So far two projects in the Baltic Sea have been refused because of effects on sea ducks (Adlergrund and Pommersche Bucht).

If the windfarm is planned in the Natura 2000 site, the subsidy is not paid.
SEA has been made for the designated preferred areas for windfarms. EIA still has to be carried out for each project but probability for getting the licence is higher in the preferred windfarm areas.
The first "test" offshore windfarm in Germany (alpha ventus, 12 turbines, 60 MW) will start in 2008. It is planned to carry out ecological and scientific research there. Ministry of the Environment predicts that there will be 1 500 MW (300-500 turbines) installed by the end of 2011 in German offshore areas.

BSH in cooperation with external experts has developed different standards to help windfarm developers. Standards for EIA, geotechnical site and route surveys and for design of offshore wind turbines are available in English on BSH home page: http://www.bsh.de/en/Marine_uses/Industry/Wind_farms/index.jsp.
Two more standards are under preparation:

- Requirements for risk assessment
- Safety and security concept.

There is a deconstruction obligation after 25 years of operation (turbines can be changed if the foundation is in good condition). Bank guarantee is required for deconstruction.
The turbines must have special lights for ships and planes and collision-friendly foundations.
Maximum 80 generators can be in a windfarm.

Discussion:

- If developer has not started building of the windfarm in time then new EIA has to be made.
- BSH does not hand out raw EIA data, only public reports (because of commercial interest of applicant or consultant).
- Governmentally funded research data should be public information (except if they are ordered from consultants who keep the copyright).
- It is cheaper for developers to plan windfarms in the preferred areas where data exist.

Marine spatial planning in Germany
Nico Nolte, Federal Maritime and Hydrographic Agency (BSH), Germany
Mr. Nolte introduced the aims and principles of marine spatial planning and practical implementation in Germany.

Marine spatial planning (MSP) is a supporting tool for management of increasing human activities in marine areas. It enables to get a broad overview on all uses and find solutions for conflicts. Need for marine spatial planning is stated in the EU Blue Paper on Maritime Policy as well as in HELCOM recommendation 28E/9.
In Germany the recommendation to expand spatial plans of the States to the territorial sea was formulated by the ministerial conference in 2001. Now it is implemented in Mecklenburg-Vorpommern and under preparation in Schleswig-Holstein.
Spatial planning of the EEZ is responsibility of the Federal Republic.
Main principles of terrestrial spatial planning can be applied also for the sea. However, there are some **specific aspects of MSP**: the planning area is dynamic, complex and naturally variable, there are no administrative borders. Therefore, ecosystem-based approach must be used and planning must address ecoregions.
The benefits of MSP: it is forward looking and long-term planning, which gives security to stakeholders; it includes all sectors and co-ordinates uses of the sea, thus minimizing the conflicts. MSP can define priority areas (reserved for a defined use), reservation areas (defined priority use) and suitable areas (defined use is excluded outside of those areas).
BSH has prepared the draft **MSP for the German EEZ**, made SEA and organised public participation in co-operation with Ministry of Transport, Building and Urban Affairs. The first scoping meetings of the MSP of the German EEZ were held in spring 2005, public

consultation is taking place in 2008 and the plan is expected to be implemented as statutory ordinance in early 2009.
In EEZ also United Nations Convention on the Law of the Sea (UNCLOS) has to be considered. **MSP can address uses** like shipping, resource exploitation, submarine cables and pipelines, marine scientific research, wind energy, fishing, protection of the marine environment but regulation of some uses (e.g. fishing, shipping) is limited.
SEA is mandatory for a spatial plan according to EU requirements. It should include environmental report, transboundary consultation with authorities and public sector.

Discussion:

- Transboundary consultation means sending the draft MSP to the neighbouring countries to ask for their opinion and comments.
- It is difficult to say how much data is needed for making a MSP. In the German EEZ in the Baltic Sea the existing/planned uses were quite clear but in the North Sea it was more difficult (e.g. defining areas for offshore windfarms) because the planning area is bigger and there is not so much information.
- IMO plans have priority in the EEZ, so shipping lines should be kept free for shipping and there should be enough space planned for them in MSP.
- Regarding fishing it is more difficult because important areas are everywhere. It is not allowed to reserve or close areas for fishery, this should be done by the European Commission. MSP is more or less neutral regarding fisheries.

SESSION III: Investigations and impact assessments at different scale

Standards for offshore wind farms in the German Exclusive Economic Zone

Mr. Nico Nolte, Federal Maritime and Hydrographic Agency (BSH), Germany
Mr. Nolte introduced the standards for offshore windfarms in the German EEZ: the Standard Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment (Feb. 2007); the Standard for Geotechnical Site and Route Surveys. Minimum Requirements for the Foundation of Offshore Wind Turbines (Aug. 2003) and, the Standard Design of Offshore Wind Turbines. (June 2007).

BSH has developed the above mentioned standards in cooperation with other agencies, universities and the private sector. These standards are not legally binding but guidelines for developers and participating institutions, to provide them legal, planning and investment security.

Environmental Impact Assessment is mandatory for most of the projects (all windfarms consisting of 20 or more turbines). The Standard provides detailed information on the scope and methodology of required investigations.
The baseline study has to be carried out within 2 years before the construction but already after the first year the licence can be given. Baseline studies as well as monitoring have to include also a reference area to compare natural developments and impacts of the windfarm. Monitoring of impacts is obligatory during construction phase and afterwards at least during 3 years.
In the preferred windfarm areas where BSH has a lot of information, exemptions can be made (not all standards have to be followed).

Standard for Geotechnical site and route surveys gives guidance on seabed investigations and methods to be used in different phases of the project.

Standard design of offshore windfarms describes the whole certification process from development to decommissioning. It includes explanations of terms and information on documentation and certificates needed in different project phases.

All three standards can be downloaded in English from the BSH home page:
http://www.bsh.de/en/Marine_uses/Industry/Wind_farms/index.jsp

Discussion:

- Radar surveys of bird migration are required according to EIA Standard. Radars istalled on ships are used, which are reasonably cheap - 20000 EUR. Developers hire the consultants for radar investigations. It was decided in 2001 to use vertical radar on ships but now the opinion is that this does not give reliable information, so perhaps another equipment will be used in future.
- In Denmark there are no such standards but developers have high requirements in their own interests. Insurance companies are demanding very strict certificates.
- The Standards have dynamic character and are updated according to improved knowledge. However, it still takes time to include the newest knowledge and methodologies in the standards (e.g. intelligent radar system that switches on the windfarm lights when a ship approaches, which is currently being tested).

EIA and Natura 2000 assessment for marine protected areas
Mr. Jan Kube, Institute for Applied Ecology, Germany
Mr. Kube gave an overview on procedures and content of EIA and Assessment according to Art. 6 (3, 4) of the Habitats Directive in Germany and pointed out the differences between the territorial waters and EEZ.

Differentially from the territorial waters, planning of compensation measures is not required in the EEZ (opinion of NGOs is that it should be required in EEZ as well).
In the "preferred" areas for windfarms the evaluation of alternatives is not required.
EIA should include:

- detailed technical description of the project;
- potential hazards (during installation, due to the presentce of installation as well as during operation);
- definition of the scope of investigations;
- description of the status quo of protection objects (humans, abiotic and biotic environment, landscape, cultural objects) and other uses (shipping, mining, military, cables/pipelines, fisheries, tourism, other offshore windfarms);
- validation of the status quo (to find the best place for the windfarm);
- description of potential impacts (including transboundary effects if required) and cumulative impacts;
- potential mitigation measures

Assessment of cumulative impacts is most problematic because thresholds are not defined.
Assessment according to Art. 6 (3, 4) of the Habitats Directive (also called "Natura 2000 assessment" or "Appropriate assessment") is almost always needed for offshore windfarms. It must focus on conservation objectives of the Natura 2000 sites, assess their conservation status and potential adverse impacts of the windfarm on them.
In Germany, according to the commonly agreed principle, the project may not proceed in case of significant impacts (derogation procedure is not applicable in Germany conserning offshore windfarms).
The content of Art 6 assessment is translated from the Habitats Directive. Assessment of cumulative effects is again the most problematic point. The authorities have to decide, which projects have to be considered for assessment of cumulative impacts.

Discussion:

- Difference between EIA and Art 6 assessment was discussed:
    - EIA is always obligatory but Art. 6 assessment only in case of potential adverse effects on conservation objectives of Natura 2000 sites (i.e. in or near of Natura 2000 sites).

    - In Germany the developer is responsible for conclusions made in EIA and has to pay for monitoring to prove it. With Natura 2000 assessment it is more difficult because monitoring of Natura 2000 sites is responsibility of the government.
- Assessment of cumulative impacts should be done on a European or flyway level in some cases (e.g. cumulative impacts of offshore windfarms in North-Europe and shooting of birds in Italy and France might be significant for some migratory bird populations).
- The Baltic Environmental Forum is planning to organise another workshop in autumn where guidelines for Environmental Impact Assessment of offshore windfarms for the Baltic States will be discussed. The goal is to include only really necessary studies in the guidelines.
- To get baseline information on bird migration in the Baltic States, a joint (governmental) research project of the 3 Baltic States would be needed. The total costs could be approximately 1-2 Million EUR.

Ecological research initiated by the German Federal Government in the North and Baltic Seas in relation to the planned use of wind energy
Jan Kube, Institute for Applied Ecology, Germany
Mr. Kube provided an overview on ecological research projects initiated by the German Federal Government in the German waters in relation to the planned use of wind energy.

The projects have been funded mainly by the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU); Federal Environment Agency (UBA); Federal Agency for Nature Conservation (BfN) and 2 trusts: Stiftung Offshore Windenergie (SOW) and Deutsche Bundesstiftung Umwelt (DBU).

In 1999 a BfN workshop on "Potential effects of human technique on offshore environments" took place, after which the first concept for impact assessment of offshore windfarms was developed. During 2001-2003 the German law on renewable energy and strategy for the use of wind energy offshore were adopted and first versions of EIA standards developed. Various research projects related to risk assessment of offshore wind energy were carried out.
In 2003-2004 many BMU/BfN projects (investigations of benthos, fish, bird migration routes, seabirds, marine mammals) were carried out due to the need for designation of marine protected areas – as result, nature reserves in the EEZ were designated. The need for marine spatial planning came up in 2003-2006 when several BMU/UBA/BfN projects on legal aspects, methodology to search for suitable areas for offshore windfarms, spatial planning and SEA were carried out and resulted in designation of suitable areas for offshore windfarms in 2006.

To support the developers regarding testing of constructions in 30 m depth, the Fino-1 research platform was established in the North Sea and intensive research (meteorology, hydrology, effects on environment) carried out in 2003-2005.
Fino 2 platform was erected in the Baltic Sea in 2007. Additional research topics there are ship traffic analysis and climate change. Institute for Applied Ecology is implementing there a project to develop remote technique for documenting bird migration and collisions. It consists of fixed beam radar "Bird scan" and visual automatic recording system (VARS).
Also dead birds are collected, in the first year 50-100 dead birds were found.
Ca 1000 bird tracks are registered in a week, with bad weather this number increases significantly. Research platform Fino-3 for technical testing will be ercted in August 2008.

A test wind farm "alpha ventus" (12 x 5 MW turbines, 60 km offshore, 30 m depth) will be erected in 2008-2009. The aim of the research project is development of the technique and remote controlling systems (including environmental monitoring) and getting practical experiences.

More information about German governmental research projects can be found at:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety:
http://www.erneuerbare-energien.de
http://www.habitatmare.de
http://www.umweltbundesamt.de
http://www.fz-juelich.de (project management)
http://www.bine.info/templ_main.php/erneuerbare_energien/windenergie/
(information service)
Trusts:
http://www.dbu.de/projekt_24127/_db_1036.html
http://213.133.101.147/offshore/version1/home.html
Wind offshore farm testing field "alpha ventus":
http://www.alpha-ventus.de
http://applik-14.iset.uni-kassel.de/rave/faces/public_content/auftakt_08_05.jsp
Research platforms:
http://www.fino-offshore.de/
http://www.fino2.de/
http://www.fino3.de/Joomla/index.php

The environmental monitoring programme at Horns Rev and Nysted offshore wind farms, Denmark
Jesper Kyed Larsen, Vattenfall, Denmark
Mr. Larsen introduced the environmental monitoring programme at Horns Rev and Nysted windfarms in Denmark and the monitoring results concerning impacts on benthos, fish and marine mammals.

Horns Rev (in the North Sea, 14 km from coast, 80 turbines, built in 2002, owner Vattenfall) and Nysted (in the Baltic Sea, 10 km from coast, 72 turbines, built in 2003, owner DONG-Energy) windfarms were established as demonstration projects to build up knowledge on environmental impats of large-scale offshore windfarms. The studies were carried out in impact and reference areas before, during and after building of the windfarms in the time period 2001-2006 (1999-2006 incl. EIA pre-studies). The costs were 11 Million EUR and the project was financed publically (through electricity bill by energy consumers).
An international advisory panel of experts was formed to contribute to the process.
A range of topics was addressed including hydrodynamic regimes and coastal morphology; benthic fauna and flora; fish; marine mammals; birds; visual and socio-economic effects.

The results showed that the biomass and also diversity (including rare reef species) of benthic fauna and flora increased in windfarm sites due to creation of artificial reefs by the windfarm. Three years after building of the Horns Rev windfarm, the succession of community was still ongoing. Local effects of the cable were monitored in Nysted but fauna and flora were quickly recovering after 2 years.
Fish study did not find any differences in fish communities between windfarm and reference areas. Also no artificial reef effect could be demonstrated. Electromagnetic field effects of the seacable are apparently small, although there were no clear results.
Hydroacoustic method was mainly used for fish studies – it enables to cover large area but data analysis is quite complicate.
Possible hydrodynamic effects on Sandeel habitat were also investigated but the results showed that there were even more Sandeels in the windfarm than outside.
Marine mammals study investigated possible impacts of noise and changes in food availability. Aerial surveys and satellite transmitters were used for monitoring of seals and T-PODs for Harbour Porpoises. The results showed that both, seals and porpoises were affected by pile driving noise while no effects were found during operation, with the possible exception of Harbour porpoise at Nysted, where numbers were low.

Conclusions: The studies have shown that Nysted and Horns Rev windfarms have had very little impact on the environment. However, such studies schould be repeated somewhere else. It should be taken into account that offshore studies are difficult, there can be also many other impacting factors than windfarms. Long-term post-construction monitoring is needed because stabilizing and habituation might take several years.
Denmark has decided to carry out a follow-up programme (budget ca 1 Million EUR) focusing on remaining important issues concerning impacts of windfarms on environment as well as on international cooperation.
More information on environmental monitoring at Nysted and Horns Rev can be found at: www.ens.dk/sw49707.asp; www.hornsrev.dk; www.nystedhavmoellepark.dk.
The book "Danish Offshore Wind – Key environmental issues" (DONG Energy, Vattenfall, the Danish Energy Authority, the Danish Forest and Nature Agency, 2006) can be downloaded or ordered for free from
http://ens.netboghandel.dk/PUBL.asp?page=publ&objno=16288226

Discussion:

- Nysted and Horns Rev windfarm locations were selected based on screening of Danish waters to find best locations of offshore windfarms.
- In Sweden there is a clear line between permit conditions and research. Only those studies can be demanded from developer that are obligatory for getting the permit. If SEPA has an interest for research then it is added up and financed by SEPA.
- Nysted and Horns Rev were demonstration projects, therefore more detailed monitoring was done than usually required.
- In Germany there are requirements set for obligatory monitoring of effects of windfarms but also research is possible. The basic set-up of monitoring is similar to Danish.
- There are quite good methods for monitoring of benthos and marine mammals but there is no good tool for bird studies. More efforts should be put in development of methods for bird studies.

Avian avoidance behaviour and collision risk: Experiences from the offshore wind farms at Horns Rev and Nysted
Mr. Anthony David Fox et al., National Environmental Research Institute, Denmark
Mr. Fox presented the results and conclusions from monitoring of effects of Horns Rev and Nysted offshore windfarms on birds.

As the resources were limited, the study focused on long-living waterbirds that are more vulnerable to loss than small passerines. Three main issues were investigated:

1. avoidance responses, which cause feeding displacement;
2. avoidance responses, which cause diplacement of movement (and consequently increased energy load for birds);
3. collision risk.

Methods:
The study was carried out 3 years before and 3 years after construction.
Aerial surveys were used as more time-efficient method than ship survey to map bird distributions. Ship radar was used in combination with visual verification (species and numbers were recorded) to map bird movements. Vertical radar was used to get overview on height distribution of birds but not very successfully (Eiders fly over the windfarm at night). Infrared camera was mounted on a wind turbine to detect avian collisions but this was efficient only for large birds (which were the main study objects).
Conclusions:
There is some effective habitat loss caused by behavioural displacement, but in Nysted and Horns Rev studies this was highly species specific and at the single wind farm level this was not biologically significant at either site. Displacement was most notable amongst Divers and Long-tailed Ducks but most species were too occurred at too low densities to detect effects.

Flying birds avoided both wind farms at a variety of levels (75 % of birds flying towards the turbines at 1-2 km distance avoided flying into the windfarm); amongst those entering between the turbines, birds showed clear changes in behaviour that minimised collision risk (flying low equidistant between the turbine rows or above rotor height).
Collision risk modelling suggested very low levels of collisions amongst the Common Eiders at Nysted (ca 50 Eiders per year for the whole windfarm) and this was confirmed by direct observations – no collisions were detected.
However, the findings from those two sites in Denmark should not be extended to other species and other areas. Although the impacts on birds from these two wind farms are considered minimal, taken together with other human impacts (e.g. bycatch, habitat loss due to sand and gravel excavation, enhanced shipping traffic, competition with fisheries etc.) and the prospect of many more wind farms in future, assessments of the cumulative effects of all these developments should be urgently undertaken.
All reports can be downloaded at http://www.ens.dk/sw42149.asp.

Discussion:

- Studies of benthos, fish, birds should be combined (ecosystem approach).
- Windfarms should not be erected in areas of high bird densities to avoid problems from the outeset.
- Data from the first demonstration projects are made public but is not the case for commercial data. There is an increasing need to share information, as it increasingly important to improve our knowledge about impacts of windfarms.
- 2-3 years monitoring might not be enough to detect all effects. For example Common Scoters showed avoidance in the first 3 years but now forage between turbines at densities as high inside the windfarm as outside.
- It is helpful to establish political thresholds for such vast projects - how big an impact can be tolerated? For Nysted and Horns Rev windfarms the threshold set for collision mortality of Eiders was 1% of the flyway population but the study results did not come even near to this threshold level.
- Impacts of feeding displacement are difficult to study. This type of impact necessitates some form of individual based modelling that incorporates intra-specific competition, energy cost/benefits of differing feeding opportunities and other factors taken into consideration.

The Monitoring & Evaluation Programme at Egmond aan Zee offshore windfarm
Jakob Asjes, Institute for Marine Resources & Ecosystem Studies (IMARES), Netherlands
Mr. Asjes gave an overview of the monitoring and evaluation programme of the Egmond aan Zee offshore windfarm in the Netherlands.

Offshore windfarm at Egmond aan Zee (10-18 km from the coast, 36 turbines) was built in 2006 as a demonstration project. Monitoring and evaluation programme was funded by the Dutch government and its aim was supporting offshore wind energy development through building knowledge on environmental impacts.
The research topics included birds, marine mammals, fish, benthos, public opinion, shipping and safety, underwater noise. IMARES was the programme coordinator.

Monitoring programme for birds includes collision measurements (not carried out yet because there is no good technique yet available), studies of flight patterns and local movements by radar surveys and boat counts in and around the windfarm and, development of prediction models to calculate effects on population.
Grey seals were marked with transmitters to get data about their migration.
Harbour porpoises were studied using T-POD detectors and observations from ships during bird counts.

Regarding fish and benthos also potential positive effects are investigated (artificial reefs, prohibiting of trawl fishery in the windfarm). Fish studies include surveys of pelagic and demersal fish, also fish tagging and fish telemetry (transmitters) are used.
Fish and benthos inventory will be repeated in 2011 to study the long-term effects.
For benthos various sampling techniques are used to find all species present. The goal is to study the processes and relations with fish/fishing.
Public attitude is studied through interviews and internet panel in different phases of the project (before and during construction, 1st and 2nd year of operation).
Regarding risks for ships, potential damage in case of collision (including impact of oil spills) and influence on radar was investigated by modelling.
Underwater noise was measured with help of underwater hydrophones before and during construction and during operation of the windfarm. For assessing impacts on marine mammals and fish experimental data (including studies of hearing sensitivity of seals) as well as data from literature are used.
All reports will be in English and available at www.noordzeewind.nl and www.windoffshore.nl. Report on shipping and safety is already available and report on public opinion will be available in 2008. Intermediate reports on noise, birds, marine mammals, fish and benthos are expected in 2008 and final reports on noise, birds and marine mammals in 2009 and on fish & benthos in 2012.

Discussion:

- Ship collision risks at Egmond aan Zee were evaluated by institute Marin using modelling, calculations. The results are probability assumptions and estimation of cumulative effects. To avoid risks from drifting ships, the ships guarding windfarms and managing drifting ships were proposed as mitigation measure.
- Investigations of the magnetic field were not carried out at Egmond aan Zee because based on earlier investigations it was not considered to be necessary.

The We@Sea project. Research line 2: Spatial Planning and Environmental Aspects
Jakob Asjes, Institute for Marine Resources & Ecosystem Studies, Netherlands
Mr. Asjes gave a brief overview on the Dutch governmental research programme We@Sea and its research line 2 on spatial planning and environmental aspects related to development of offshore windfarms.

The We@Sea programme was initiated to build up knowledge and technical expertize for sustainable development of offshore wind energy. It is 50% governmentally financed but partners had to work out the projects to get the money.
In the research line 2: Spatial Planning and Environmental Aspects only projects for WP1 (Decision support system) and WP4 (Challenges for nature) are implemented.
WP1 deals with defining necessary information for development of offshore wind energy, specifics for a decision support system on cumulative effects, data on wind and wave conditions, seabed data and developing relevant GIS technologies.
In frame of **WP4** the negative and positive effects on ecosystem and possibilities for mitigation and creation of positive effects are studied and new monitoring techniques developed - e.g. WT Bird system for detecting bird collisions; Bird Radar (ROBIN Lite) for monitoing flying birds at sea in 10 km range; new system on detection of marine mammals (acousting detection from ships to measure densities of marine mammals) or use of high resolution sonar for near-turbine fish observations.

Discussion:

- It was suggested that smaller number of more powerful turbines would be better for environment than bigger number of smaller turbines. However:
    - For bigger turbines bigger distances are needed, so the overall area of the windfarm is approximately the same;

    - Bigger distances between turbines are probably safer for birds and avoidance effect can decrease but it is difficcult to say without studies.
- Automatic collision registration system (WT Bird) was tested with tennis balls on land. It worked, collision was detected and camera started to work. Developer agrees to install it on a turbine but the manufacturer does not give a permission for safety reasons.

SESSION IV: Working groups on the main gaps and necessary next steps regarding development of offshore wind energy in the Baltic States

Lithuanian working group

- There is no clear policy on wind energy development in Lithuania. The energy strategy is mentioning it in general terms as an important sector, however there is no more concrete political measures agreed and implemented.
- There is a need to review legislation related to the use of offshore areas and building permissions in the sea.
- The group admitted the need for strategic planing of the marine area use and that cumulative effects of economic activities should be considered.
- Such strategic planning as well as environmental assessment of potential threats should be also done by independent experts who would make objective assessment and help the state authorities to have objective opinion.
- The group has stressed that stronger cooperation between Ministry of Economy and Ministry of Environment is needed to discuss and agree on strategic issues. Different options to organise such forums were discussed. Dialogue with other stakeholders was also highlighted as very important.

Latvian working group

The group concluded that the main problem regarding planning offshore windfarms in Latvia was uncertain ownership of the Territorial Sea and Exclusive Economic Zone.
It was agreed that the necessary next activities should be:

- a meeting organised by the Renewable Energy Department of the Ministry of Environment to plan further steps;
- improvement of national legislation;
- clarifying responsible institution for issuing permits.

Estonian working group

- The group concluded that minimum standards for EIA for offshore windfarms should be developed, including baseline study and monitoring programme.
- A strategy/planning of use of Estonian territorial sea and EEZ is needed
    - The coordinating ministry must be agreed and inter-ministerial working group formed.
- Legislation regulating installations in the sea must be worked out.
- A research platform could be built in Estonia in cooperation of developers and government. Interest of developers is studies on wind resources etc., interest of the government is environmental issues.
- Baltic cooperation on studies would be needed (e.g. studies on bird migration).

EU working group

Advice on necessary next steps in the Baltic States given by guest experts from Germany, Denmark, Sweden and the Netherlands was the following:

- Political vision for electricity supply including targets for offshore wind energy and maritime strategy should be developed to support the developers.
- Coordinated Baltic baseline survey focusing on seabirds and migration should be carried out. Experts here can help to set priorities and institutes from other EU countries could be involved for expertise and advice (expert panel).

    - As result, the map of suitable areas for windfarms and SPAs can be created.
- Licencing procedure should be developed including competition rules and description of steps/work flow from application till licence
    - A workshop on relevant legal issues could be organised.
- Methodological guidance for EIA for offshore windfarms should be prepared
    - A workshop on EIA methodology and guidelines is planned in autumn 2008;
    - Draft guidelines prepared with German assistance.

Conclusions

- The Baltic countries have similar problems: offshore wind energy as new development, gaps in legislation, lack of political vision and strategic planning of use of marine areas, lack of data on marine environment and lack of knowledge on environmental impacts of offshore windfarms and methodology for their assessment.
- The workshop brought together different Baltic stakeholders related to the topic: developers, consultants, ministries dealing with environment, economy & planning issues, subordinated institutions of ministries, scientists, environmental NGOs. Feedback from all of them was that the workshop gave a lot of new information and enabled to discuss and define the main gaps and necessary next steps.
- The necessary next steps for the Baltic States would be:
    - Development of political vision for offshore wind energy and maritime strategy;
    - Coordinated Baltic baseline ecological survey on seabirds and bird migration to define suitable areas for offshore windfarms and SPAs;
    - Development of legislation and licencing procedure for offshore windfarms;
    - Development of methodological guidelines for EIA for offshore windfarms.
- The next planned events:
    - Workshop on methodology for EIA for offshore windfarms planned in autumn 2008;
    - It was proposed to organise a workshop on legal issues and licencing procedure (involving lawyers and relevant officials from the Baltic States and Germany) – probably in autumn 2008.

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