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Use of offshore wind energy in the German North and Baltic Sea – Climate protection versus biodiversity?

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Introduction

The subject of discussion about the construction of offshore wind farms in the German North and Baltic Sea is their contribution to the **climate protection**. According to Mr. Trittin – Federal Minister for the Environment in Germany – by 2030 wind energy could account for **25** % of the German energy consumption compared to 1998 standards, **15** % of which could be produced by offshore wind farms.

Even though offshore wind farms represent a renewable energy production, they cause **conflicts between the protection and use of resources**. On the part of nature conservation the possible **contradiction** between offshore wind energy plants and the protection of biodiversity is pointed out. "The **Strategy of the German Gov***ernment* on the use of off-shore wind energy" aims at creating the necessary preconditions on the supply side that will allow for a rapid construction of offshore wind farms. Furthermore it envisions to solve the existing conflicts between **climate protection and biodiversity**.

Content

Therefore, the presentation is divided into four parts:

- Key elements of energy policy in Germany

 national goals in the development of renewable energies
- Policy instruments for promoting offshore wind energy

 Renewable Energy Sources Act, Strategy of the German Government on the use of off-shore wind energy and research and development for offshore wind energy

Recommendations solving the divergence between climate protection and biodiversity

4. Outlook

- climate protection versus biodiversity?

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Energy policy in Germany

Achieving a **future-orientated energy supply** is one of the Federal Government's prime goals. In this, equal emphasis is laid on the following **objectives**:

- conservation of the environment and resources, especially climate protection,
- economic efficiency for producers and consumers and
- securing the **energy supply**.

Germany has initiated a new direction in **energy policy**. The key aspects are:

- massive expansion of renewable energies,
- marked improvements in **energy efficiency** and economical use of energy and
- phasing out nuclear technology and its attendant risks.

Additional information can be derived from the official website of the Federal Environment Ministry: <u>http://www.bmu.de/de/800/js/base/</u> or the website especially for renewable energies: <u>http://www.erneuerbare-energien.de/1024/</u>.

Policy targets of the German Government in the development of renewable energies

The **short-term target** is to **double** the share of renewable energies in Germany between **2000 and 2010**, i. e. increase the share of renewable energies in electricity generation to **12.5** % and the share of renewable energies in total primary energy consumption to **4.2** %.

With the revised Renewable Energy Sources Act, the Federal Government has recently agreed on a **medium-term target for 2020**: increase the share of renewable energies to at least **20** % of electricity consumption.

The Federal Government's **long-term objective** is that renewable energies are to account for at least **50** % of total energy supplies by **2050** at national and global level.

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The German Government's political objectives in the energy sector are closely related to the challenges of **climate protection**:

In the **long term** a marked reduction in CO_2 -emissions is required. A reduction of **80 %** in emissions by the industrialised countries by **2050** is considered to be necessary.

It was agreed in the **coalition agreement** that Germany would aim to achieve a reduction of **40 %** in **Kyoto** gas emissions by **2020**.

The Federal Government also aims to ensure that in the medium to long term, renewable energies will be able to **compete on the energy market**. In the long term, therefore, a **balanced mix of fossil and renewable energies** is seen as the way forward.

Implementing these objectives calls for **a whole raft** of measures:

- the Renewable Energy Sources Act,
- market incentive programmes for renewable energies and
- research and development for renewable energies.

Renewable Energy Sources Act

The Renewable Energy Sources Act is one of the **central elements** of the Federal Government's energy policy. The act deals with the **purchase** of, and the **compensation** to be paid for, electricity exclusively generated from renewable energies by grid operators.

The Renewable Energy Sources Act imposes three obligations on **network opera-tors**:

- They are obligated to **connect** to their grids installations generating electricity from renewable energies.
- They must first **purchase** all of the electricity produced from these installations as a priority.
- They must pay **fixed rates** for the electricity.

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The Strategy of the German Government on the use of off-shore wind energy

To reach the aims of the German Government **wind power** plays an important role in terms of climate protection.

The number of new wind power installations **on shore** per year decrease. In order to keep up the high level of wind power expansion, it will be necessary to

- further expand suitable on shore sites,
- to replace older and smaller on shore plants by modern and efficient ones and
- to start developing appropriate locations offshore.

At the moment **30 wind farms** have been applied for in the Exclusive Economic Zone (EEZ) (23 North Sea/ 7 Baltic Sea, 5/ 2002) which comprise several hundred separate wind energy plants.

One important strategic focal point is that the expansion of this type of energy should be compatible with **nature** and the **environment** and also be **economically viable**.

The **legal situation** needs therefore improvement not only from the environmental and nature conservation perspectives, but also in the field of planning and investment security.

The revised **Federal Nature Conservation Act** contains important new regulations for marine protection in the EEZ. They deal with the identification of protected areas on the basis of the Habitats and Birds Directives ("NATURA 2000") as well as the provisions for especially suitable areas for the establishment of wind power plants and the licensing procedure in accordance with the **Offshore Installations Ordinance**.

Navigational issues as well as **environmental protection** and **nature conservation issues** and **commercial** (fisheries, mineral resources) as well as **military uses** have to be taken into consideration when choosing the site. They are important for the construction phase, the operation of the plants and for the technical layout of the plant.

Environmental protection and nature conservation issues are covered especially by requiring an **Environmental Impact Assessment** (EIA) pursuant to the Offshore Installations Ordinance.

Furthermore the expansion of offshore wind energy should take place **gradually** and be **accompanied by an ecological research**.

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Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Div. "Solar energy, Biomass, Geothermal energy; Market incentive programmes for renewable energies" and Div. "Research in the Field of Renewable Energies" Alexandra.Langenheld@bmu.bund.de The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety sponsors research projects, which aim at providing **scientific information** for an "environmental-friendly" expansion of offshore wind farms.

Furthermore especially the **EIA** is adopted to the special conditions in the EEZ.

Accompanying ecological research

The use of offshore wind energy is estimated to represent a **large-scale and long-term interference** with the marine environment.

There is a **lack of definite projections** for the environmental impacts of the installations due to the **lack of practical experience** (e. g. concerning barriers for migrating birds, collisions with birds or loss of habitats for marine mammals).

Therefore – following the precautionary principle – **technical research** and **research related to nature conservation and environmental protection** accompanies the gradual expansion of the use of offshore wind energy for a length of time.

In addition to a series of current research projects in the research programmes of the ministries, the German Government's **Investment Programme for the Future** has initiated research and development of environmentally sound energy sources in the field of non-nuclear energy use with a focus on using offshore wind energy.

On the one hand, there are studies on the **migration of birds** and on the **problems** of acoustic emissions generated by offshore wind turbines. These are complimented by research into the hearing abilities of small whales and seals. On the other hand, there are large-scale surveys of the population of resting migratory birds and marine mammals.

One sub-project (Technical University of Berlin) deals with the **adoption especially of the EIA** to the special conditions in the EEZ and of the marine environment. It is designed to develop legal and technical tools for precautionary measures for nature conservation and environmental protection as well as for planning in licensing procedures for offshore wind farms.

Recommendations on solving the conflict between climate protection and biodiversity

The **competing forms of use of resources** have to be considered within the licensing procedure according to the Offshore Installations Ordinance applied in the EEZ (<u>licensing authority</u>: Federal Maritime and Hydrographic Agency of Germany).

A research team, conducted by the Technical University of Berlin, worked and still works on solutions for adapting the environmental instruments providing the

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precautionary principle – EIA, Assessment according to the Habitats Directive, Strategic Environmental Assessment (SEA) – as well as the impact assessment itself to the licensing procedure of offshore wind farms and the special conditions of the marine environment.

The aim of the project is to develop the instruments in such a way that an **effective application** as well as an optimised consideration of the needs of the **marine envi-ronment** are supported. Additional information can be derived from the department's website: <u>http://www.tu-berlin.de/fb7/ile/fg_lbp/forschung/fp%20offshore.htm</u>.

A **guidance** for the application of **EIA** within the licensing procedure for offshore wind farms, for the application of the assessment required under Article 6 of the **Habitats Directive** in the EEZ as well as for the **SEA** for especially suitable areas for the establishment of wind power plants can be downloaded under the following address: <u>http://www.tu-berlin.de/fb7/ile/fg_lbp/</u>.

In current application procedures of pilot offshore wind farms a so called **"Standard Programme for environmental Examination"** is applied including a comprehensive catalogue of possible effects.

But furthermore it is necessary to take into account all requirements of the **EIA procedure** including the impact assessment. Due to the precautionary principle the environmental standards required by the EIA are stricter than the defined **indicators to permit or deny an application** according to the Offshore Installations Ordinance, which are:

- endangerment of the marine environment or
- endangerment of the bird migration.

The study therefore focuses on the **evaluation of the significance** of impacts on the marine environment due to offshore wind farms as the most important step subject to the EIA.

Main complexes of adverse effects can be distinguished in general caused by the interactions between offshore wind farms' impacts and the marine environment and its specific sensitivity.

These effects are considered to cause an **endangerment of the marine environment** respectively **endangerment of the bird migration** according to the Offshore Installations Ordinance:

- displacement and/ or collision of seabirds,
- barriers and/ or collision of migrating birds,

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- harassment and/ or displacement of harbour porpoises due to construction noise,
- harassment and/ or displacement of fish due to dispersed sediments, vibrations and/ or electromagnetic fields,
- marine pollution due to the collision of ships,
- visual impacts on the landscape and
- interactions and cumulative effects.

As an example, the criteria relevant for evaluating the "harassment and/ or displacement of harbour porpoises due to construction noise" are roughly presented.

- Because of their excessive sensitivity of hearing harbour porpoises are endangered significantly by pile construction noise.
- High sound levels are able to cause a lasting adjustment of the harbour porpoises' **hearing threshold level** resulting in a **loss of orientation** and finally the marine mammals' **death**.
- Under the level of a lasting adjustment of the hearing threshold level several **reactions of behaviour** occur, e. g. escape and/ or disturbance of communication caused by **masked acoustic signals**.

In consequence, if the **sound level** is deemed to be too high the permission of the offshore wind farm's construction should be denied or additional requirements imposed.

But where to fix the limit to cope with climate protection as well as biodiversity?

The research project, conducted by the Technical University of Berlin, has activated a **process of discussion** not only between biologists but also between planners and politicians by organizing several workshops.

The **aim** was and still is to develop

- **approaches** of evaluation,
- criteria of evaluation and

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• **indicators** of significance

...to **specify** the undetermined terms to permit or deny an application

- endangerment of the marine environment or
- endangerment of the bird migration.

Transparency of the evaluation as well as planning security require concrete **indica-tors of significance**.

Exceeding these indicators classifies the environmental impacts as significant and the project has to be denied for reasons of the endangerment of the marine environment or the endangerment of the bird migration.

Outlook – Climate protection versus biodiversity?

"The **Strategy of the German Government** on the use of off-shore wind energy" creates not only the preconditions on the supply side that will allow for a rapid construction of offshore wind farms to reach the aims of the German Government but also provides the fundamentals to solve the existing conflicts between climate protection and biodiversity:

- 1. improvement of the **legal situation**
- 2. the expansion of offshore wind energy
- takes place gradually and
- is accompanied by an ecological research

...due to the **lack of practical experience** and the estimated **large-scale and long-term interference** with the marine environment.

The accompanying ecological research provides **technical information** and research results related to **nature conservation** and **environmental protection**.

But the outcomes for example of the large-scale surveys of the population of marine mammals or the findings on their hearing abilities as well as on the problems of acoustic emissions generated by offshore wind turbines are **not self-explanatory applicable for the licensing procedure** for offshore wind farms according to the Offshore Installations Ordinance.

Transformation is needed to adopt the research results to the licensing procedure. The undetermined terms to permit or deny an application

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- endangerment of the marine environment or
- endangerment of the bird migration

...according to the Offshore Installations Ordinance have to be specified on the basis of **indicators of significance** derived from the results of the accompanying ecological research and monitoring.

Therefore it is necessary to retain the adopted line of **concerted action** of politicians, planners and biologists for developing approaches of evaluation, criteria of evaluation and indicators of significance.

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