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# **Wind Energy, how and where?**

North Sea Commission  
Environment Group Conference 2002

Blankenberge – Belgium  
7-9 November 2002

**W** Report of the Conference



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**This is the  
North Sea  
Commission  
Environment  
Group**

## Introduction

The North Sea Commission (NSC) is the organisation of North Sea regional authorities, elected directly by their inhabitants. The NSC is one of the geographical commissions within the CPMR (Conference of Peripheral Maritime Regions), which a.o. seeks to bring about a change of the relationship between the peripheral and the central areas in Europe, emphasizing the maritime dimension.

Much of the work of the NSC is carried out by the so called Thematic Groups. These cover various fields of common interest tot NSC members: Business Development, Communications, Culture & Tourism, Education & Research, Environment and Fisheries. All interested NSC member regions can take part. Each group has a political chair from the NSC Executive Committee and a co-ordinator, an officer supplied by one of the member regions.

### **The North Sea Commission Environment Group (NSCEG)**

Chair of the Environment Group is Councillor Gunn-Marit Helgesen from Telemark County Council, Norway, and vice chair is Councillor Alison McInnes from Aberdeenshire Council, Scotland. Co-ordinator is Per Hörberg from Region Västra Götaland, Sweden. Some thirty NSC member regions have chosen to get involved in the Environment Group.

**The overall vision of the NSCEG** is to encourage the development of sustainable communities, the sustainable use of resources and the development of policies and actions which take full account of environmental requirements.

**The aim of the NSCEG** is to progress key environmental issues, as they affect local and regional authorities bordering the North Sea, by co-ordinating and initiating projects involving all members, or on a partnership basis. The NSCEG, through the NSC Executive Committee, will attempt to influence future research and future EU and national policies. The

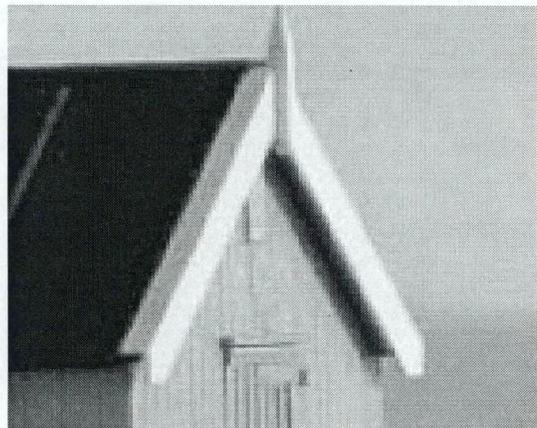
NSCEG will also take steps to encourage a heightened awareness of the North Sea as an important ecological area.

### **The practical work of the NSCEG, PWG**

The NSCEG has an Annual Meeting, where both politicians and officers participate. In connection with the AGMs, conferences are held on various important environmental themes. Just as in the NSC itself, regions in varying countries act as hosts. Recent NSCEG meetings have been hosted by Sønderjyllands Amt, Denmark, Telemarks fylkeskommune, Norway, Suffolk County Council, England, Aberdeenshire Council, Scotland and Landstinget Halland and Region Västra Götaland, Sweden.

In November 2002 the AGM was hosted by Euregio Scheldemond, consisting of the Belgian provinces of West-Vlaanderen and Oost-Vlaanderen and the Dutch province of Zeeland. The theme was "Wind energy – How and Where?".

Between Annual Meetings, the work is processed in a Project Working Group (PWG) consisting of officers, with one representative and a substitute from each NSC country. The Country Representative has the task of spreading information and gathering the views of the NSCEG members in each country. The PWG meets 3 - 4 times a year to take initiatives and develop co-operation projects and tasks remitted by the NSC Executive Committee or General Assembly.



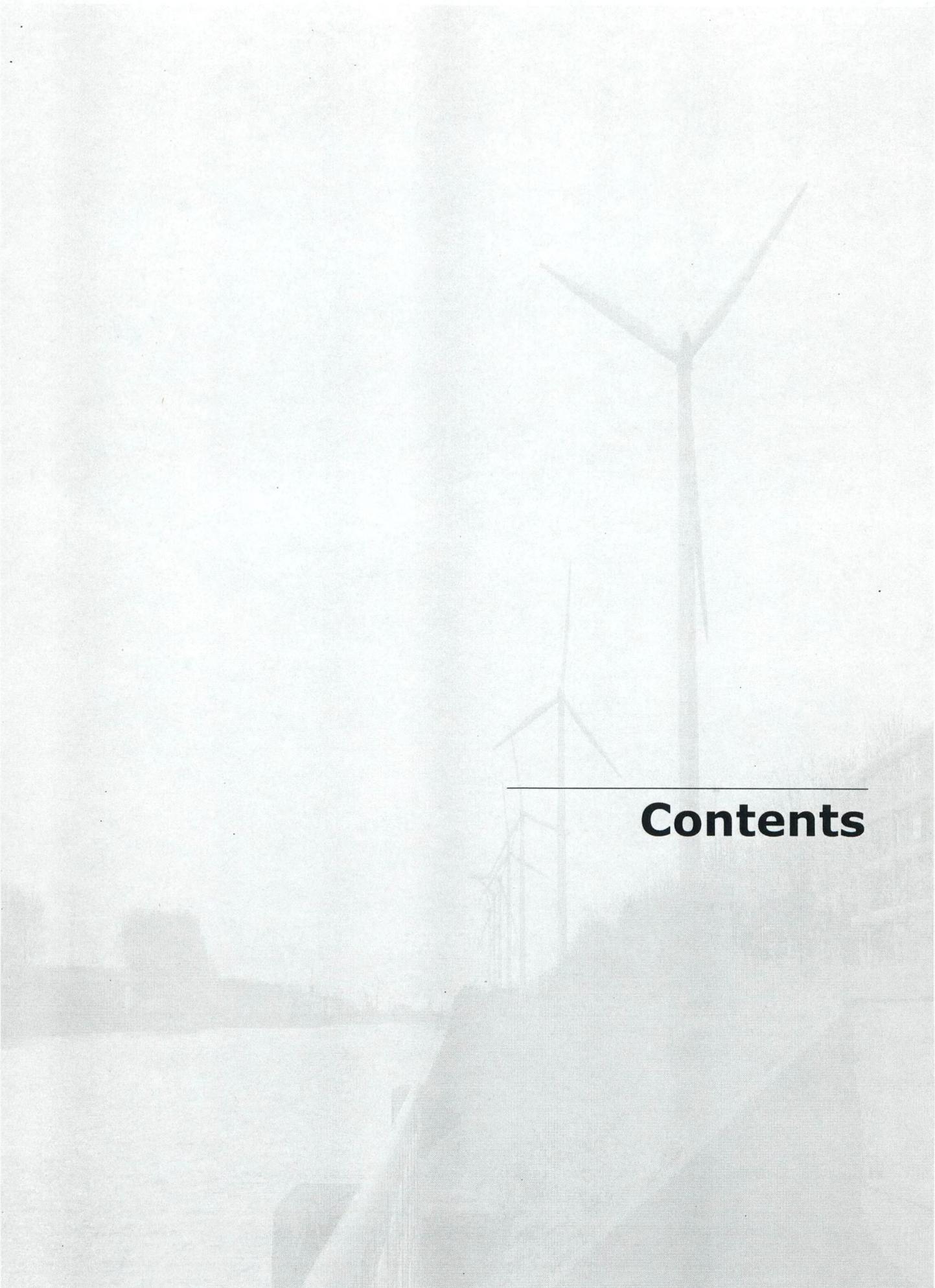
## About this Report

The NSCEG Annual Meeting and Conference 2002 was held in Blankenberge, Belgium, on November 7-9, hosted by NSC member Euregio Scheldemond. Over 100 delegates, including nearly 30 politicians, listened to presentations on wind energy and debated the future establishment of wind energy parks in their regions. Expert speakers at the Conference predicted a large expansion of European wind energy, particularly off shore (link to Presentations). This was of great interest to the audience, since many regional and local authorities today have to decide on applications for new establishments – without knowing for instance the total expected number of applications.

## Outcome

In a number of workshops (link to Workshop Reports), delegates had the opportunity to discuss wind energy issues and relate experiences from their home regions. One major request came out of the Political Visioning workshop and was adopted by the entire Conference. In a Conference Statement (link to Statement), directed to national governments around the North Sea, the participating politicians stated that clear messages are needed from national governments on their level of ambition regarding the development of wind energy. Also, there is need of some kind of recommendations for how and where large wind energy parks should be established.

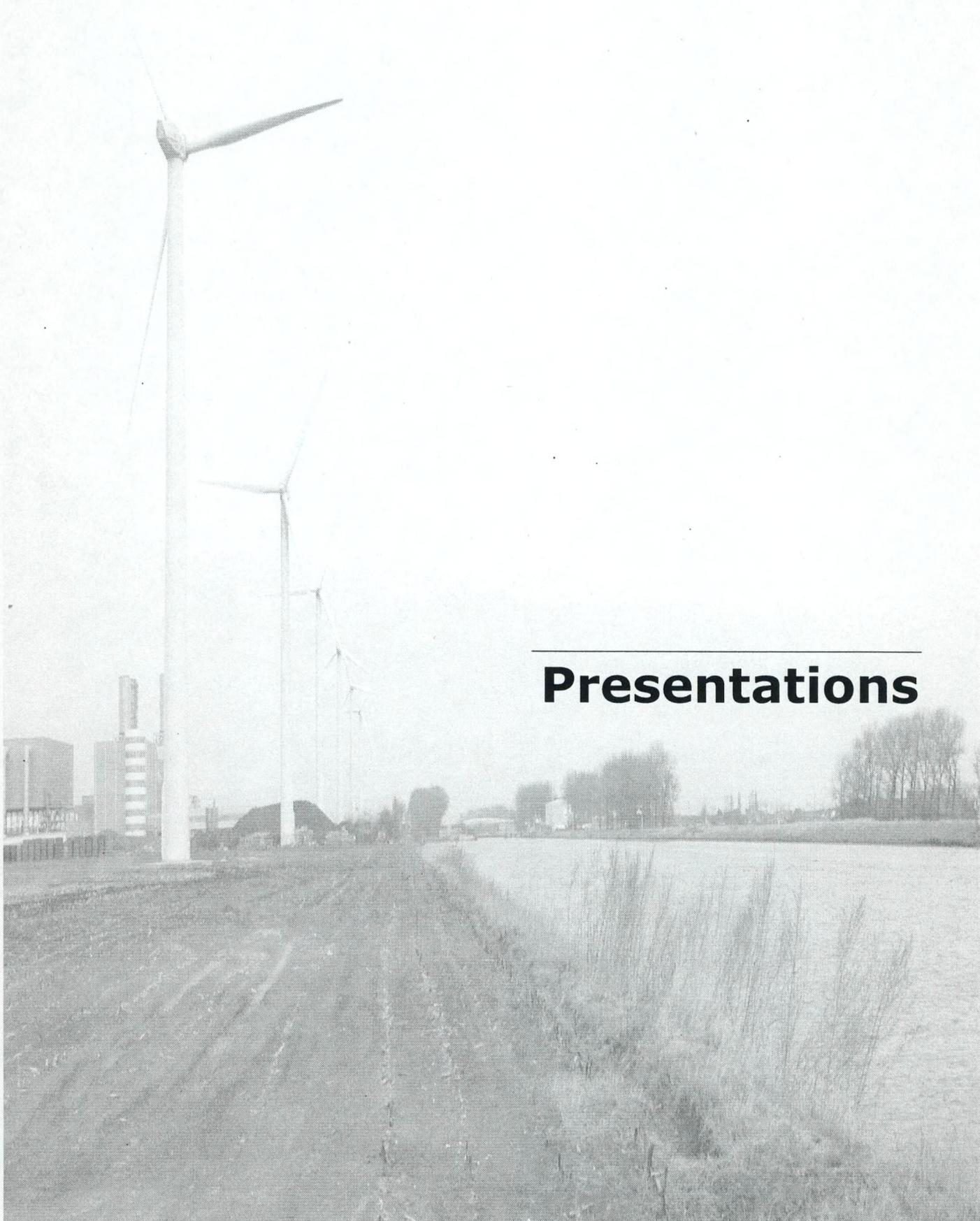




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# **Presentations**

# Introduction

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## Mrs Gunn Marit Helgesen, Councillor/Vice-president of the NSC



Conference chair councillor Gunn-Marit Helgesen of Telemark, Norway, started the conference by thanking the hosts Euregio Scheldemond and welcoming the many delegates from all North Sea countries.

Then she introduced the topic of the NSCEG Conference 2002 – “Wind energy – how and where?” – by pointing to three main issues:

**Sustainable energy sources must be developed**, both to combat climate change and to move away from unsustainable sources, like nuclear power.

And there are possibilities!

One of them is obviously energy efficiency. Only one example: recent EU studies show that industry can reduce its use of electricity for pumps, fans and compressors with 30% – and get its investment money back in three years!

Renewable sources like biomass, wind energy and solar energy are being developed and promoted in various countries (even though this still goes too slow...)

**Wind energy is one of the best developed renewable energy sources** – and has the advantage that it can be installed and removed comparatively easy (if you compare with a hydro power station, for example)

BUT: the expected wind energy expansion should not take place in a careless manner – it must be well planned and take all stakeholders into consideration.

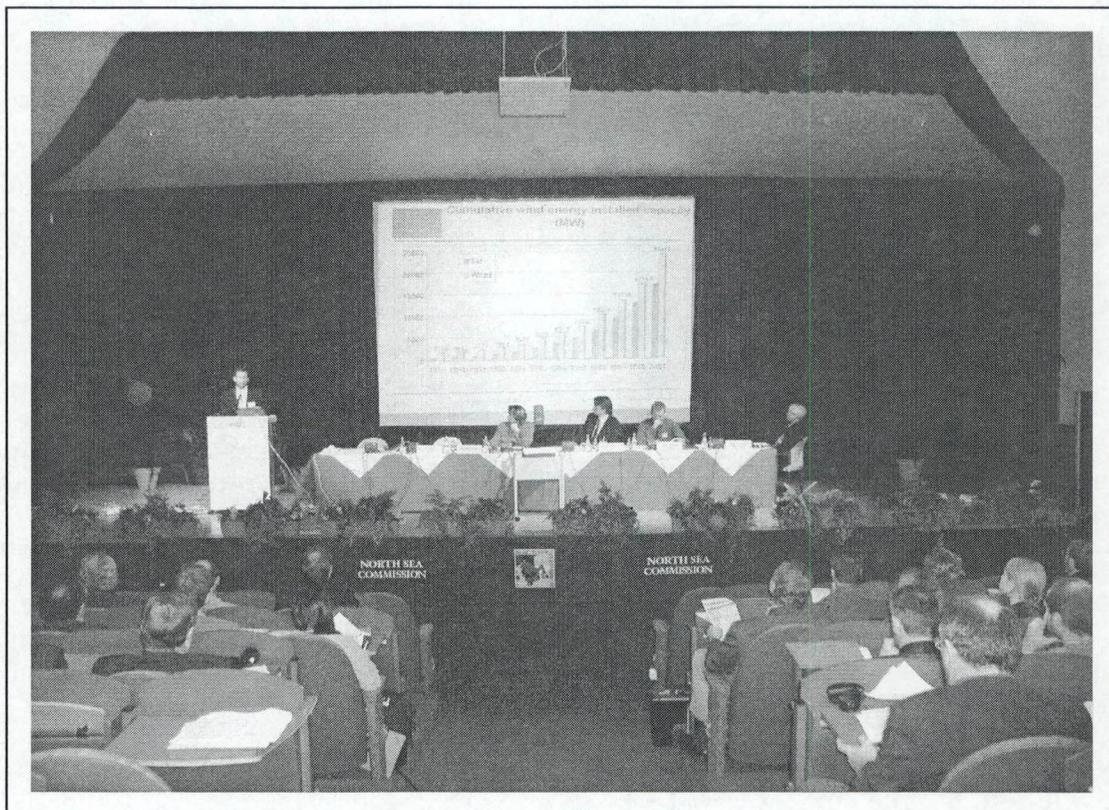
**At present local and regional politicians, the public and other stakeholder groups feel – at least in some countries – that their concerns are not being met.** That is why the NSC Environment Group has made “Wind energy – how and where?” the theme of its Conference this year. We need to make sure that local and regional interests are being consulted as part of the planning process for new wind energy!

The NSC will keep following the issue of wind energy; at the NSC General Assembly in 2003, held in Cuxhaven, Niedersachsen, Germany, there will be a special study trip – in addition to the regular environment study trip – to existing and planned German wind parks. So there will be opportunities for those of you who want to bring wind energy to the attention of your leading North Sea politicians to do so in Cuxhaven next June...

And now, our main speakers will give us plenty of information as food for our discussions. Discussions which will take place both in the workshops this afternoon and in all informal settings during our conference days here in Blankenberge.

# Development of wind energy in the EU

**Mr. Alexandros Kotronaros, European Commission,  
DG Energy and Transport, New and Renewable Energy Sources Unit**



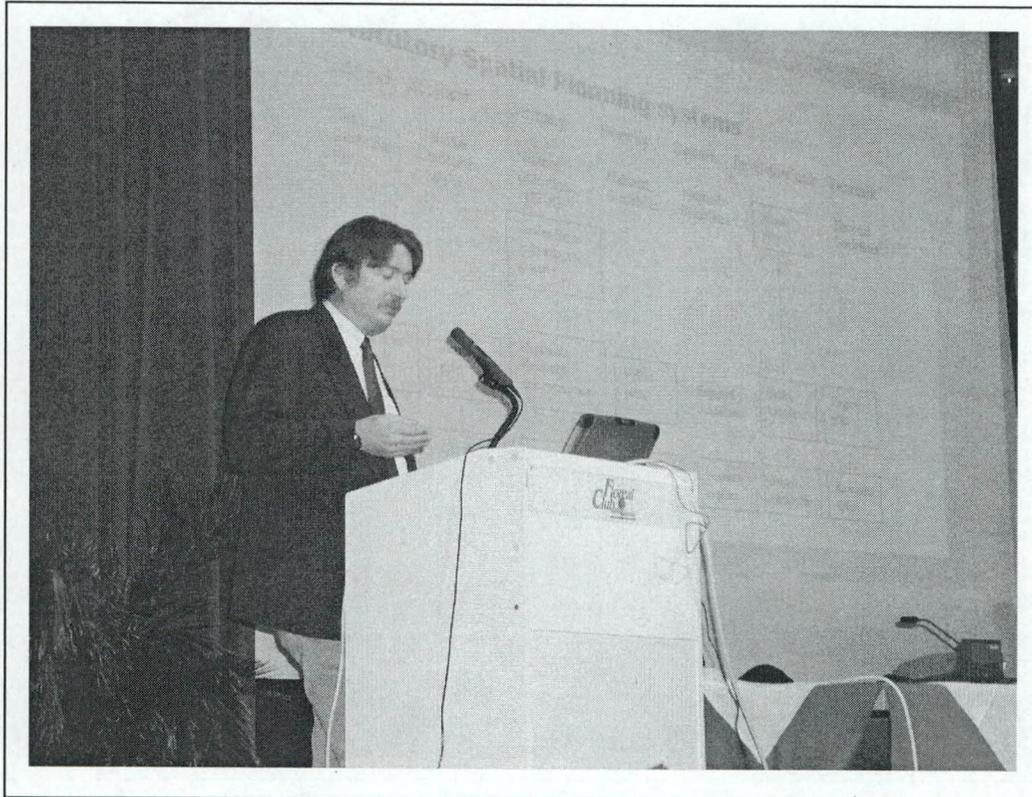
**The entire Powerpoint presentation of Mr. Kotronaros is available at the NSC website at address:  
[www.northsea.org](http://www.northsea.org) (note: 3100 KB)**

**Address: Mr. Kotronaros  
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## **Environmental aspects and technical limitations of wind energy, off shore and on land. Planning procedures in different North Sea countries.**

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**Mr. Per Hjelmsted Pedersen, SEAS Wind Energy, Denmark**



**The Powerpoint presentation of Mr. Hjelmsted Pedersen is available at the NSC website at address:  
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# Wind Energy and Regional Development Opportunities and Role of Coastal States

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**Mr. Geert Palmers, 3E, Belgium**



**The entire Powerpoint presentation of Mr. Palmers' is available at the NSC website at address: [www.northsea.org](http://www.northsea.org) (NOTE: 2493 KB)**

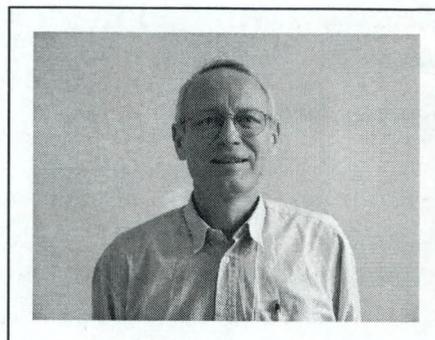
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## **Participation and involvement by the public: examples of the procedures in different countries**

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**Mr. HC Sørensen, SPOK Aps, Denmark**



**Attached to this report, you will find the presentations of  
Mr. Sørensen.**

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## Using the Interreg IIIB programme for wind energy projects

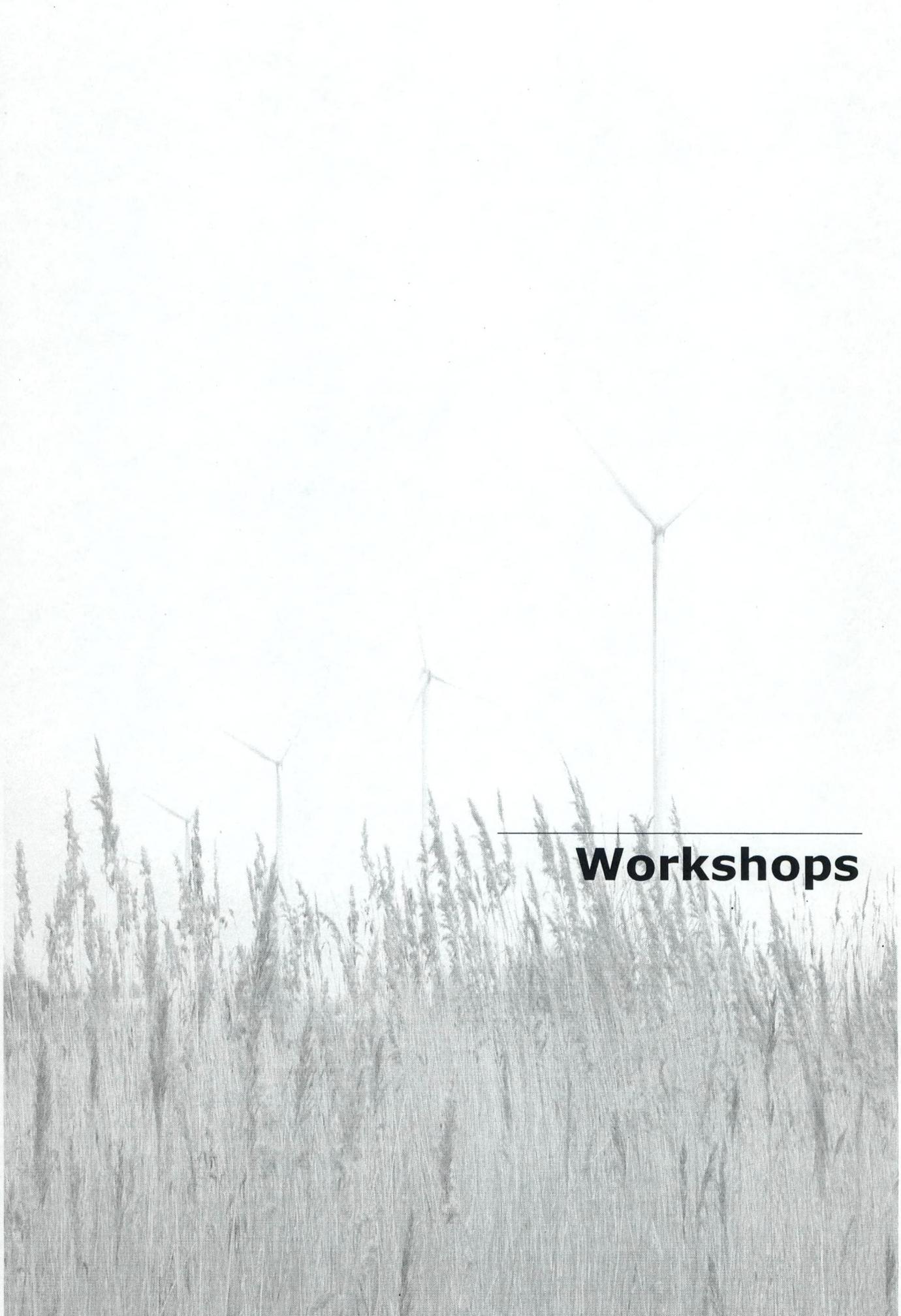
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**Ms. Lindha Feldin,  
Interreg North Sea Region  
Programme Secretariat,  
Viborg, Denmark**



**The entire Powerpoint presentation of Mrs. Lindha Feldin  
is available at the NSC website at address:  
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# Workshops

# Report Workshop A: Political Visioning

## Facilitator:

Sten Liljedahl, Landstinget Halland,  
Sweden

## Rapporteur:

Karen Greve Somerset (NSC secretariat,  
Denmark)



The workshop concentrated on **two main areas:**

- The involvement of the local and regional level in planning and decision-making
- Acceptance and participation by the public

## 1st session

The four speakers from the presentations in the morning attended the workshop as a panel, which gave delegates the opportunity of asking further questions. From the presentations it became apparent that use of wind energy will increase over the coming years. However, the EU imports 50% of its fossil fuels today, and this figure is expected to rise to 70% in 2010. Considering that most of this comes from the Middle East and Russia and bearing in mind the rather unstable political situation in the world today, it was felt that the EU ought to be more self-sufficient and to concentrate on having as local a supply of energy as

possible, which would also be seen as being more reliable.

## Open planning process

Denmark is in the forefront when it comes to utilising wind energy around the North Sea and it would be appropriate to learn from their mistakes and successes. Some examples were the need to involve the public at an early stage and that the consultation has been real, i.e. that the planners are prepared to change their plans, if there is something, which the local community strongly objects to. The examples from Denmark showed several cases where the place or appearance of wind farms had been changed, in order to take into account concerns of the local community.

The alternative to this open planning process is a closed process. Obviously, an open planning process can take considerably longer, but it appears that it is time well spent, as it is more likely to result in an acceptance from the local community. Some planners may find it daunting to face a group of people in an open meeting about a proposed wind park. It was, however, pointed out that members of the local community need to be informed, so they can base their judgement on facts rather than on misconceptions, such as the amount of noise, flashing, environmental impacts, etc.

## Local benefit

It was generally felt at the meeting that the local community had to gain something from having a wind farm nearby, before it would be generally accepted. There may be some social and economic gains to be had from the erecting and servicing of a wind farm as local people could be employed, but the most lucrative way was seen to join a co-operative and actually obtain some of the profit from the production. Besides the local community, local, regional, national authorities and the EU must also be seen to gain something and a win-win situation must be created.

It is evident that there is no integrated plan around the North Sea when it comes to off-shore wind farms and the workshop

would like to write a statement encouraging national governments to consult with each other before granting permission to off-shore wind farms.

When Denmark first started erecting wind mills/farms, there was no clear strategy as to where they should be placed and it all became rather haphazard. This is, for example, the situation in Scotland today, where councils currently are responding to each application without an overall plan. It was felt that the national government must take this lead and maybe even set certain targets to be fulfilled locally. In that way, the councils would know what was expected of them and would be able to include potential new wind farms in their development plans.

A discussion followed as to how to convince the sceptics among the general public that wind energy is a good thing. It was pointed out that they have to know the alternatives, which may be, for example, rising sea levels as a result of climatic change due to burning of fossil fuels or the uncertainty of oil supply from the Middle East. If oil prices are high, the public is more likely to accept alternative energy sources.

## **2<sup>nd</sup> session**

Only politicians attended this workshop. To a large extent it continued from the first session.

The politicians pointed out that many valuable points had been raised in the first session and that there appeared to be a role for the NSC to play. They would like the workshop to result in a statement - intended to be a written outcome of the Conference 2002 - which would be directed mainly at national governments. Most of the time in this workshop session was spent on discussing the content of this statement.

It was agreed to focus on both inland and offshore wind energy, as not all NSC regions have direct access to the North Sea.

At the 5<sup>th</sup> North Sea Conference in Bergen in March 2002 environmental ministers signed the Bergen Declaration, which in chapter 9 deals with wind energy. The delegates felt that they would like to support the Bergen Declaration and to continue the process started. It was agreed that the statement should deal with two aspects: the planning process and energy sources and that it should concentrate on the regional level, encouraging a more active involvement of the regions and more self-sufficiency of energy. The statement should also stress the need for an active dialogue and involvement of the local and regional level in the implementation of national policies. The statement should also stress the importance of an early consultation with the public, as there can otherwise be problems of getting an acceptance from the public.

The statement will be forwarded to the NSC Executive Committee for comments before being sent to the Environment Ministers. (Link to the statement.)

### **Possible Interreg project proposals were discussed**

One project could deal with the planning method describing how to find successful sites, how to implement wind farms, best practice with consideration of local objections and how to gain acceptance from the public.

Another Interreg project could deal with local renewable energy sources, and could examine how to bring benefits to the local community and how money earned from wind energy can be brought back into the local community.

# Report Workshop B: Planning procedures/ methods on land

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## **Facilitators and Rapporteurs:**

Per Nielsen, EMD,  
Per Toppenberg, North Jutland Council,  
Denmark

## **The following questions were raised at the beginning of the 2 workshop sessions:**

- Are the planning processes adequate? (Quick enough, democratic, etc.)
- How can the planning process be more
  - flexible? (across the administrative layers etc)
  - proactive?
- Are the methods sufficient according to
  - visualization?
  - calculation on environmental /economical consequences?
  - optimization?
  - animation – 3D etc?

At the beginning of each of the 2 sessions, some of the participants gave examples of wind energy planning in their home counties. The following were some of the main problems and suggestions put forward and discussed.

Need for common/international structure plans – offshore

In some regions – wind energy plans are often projects developed by big companies, and with very limited public participation or influence.

Need for better information; Air traffic influence (very large difference in regulations), TV-reception, Birds etc.

Developers have to be very thoughtful when locating wind turbines in the landscape – and very careful when choosing viewpoints for animation.

Make comprehensive plan, where the main protection interests have been taken into account from the beginning – instead of promoting a wind park in areas with good energy resources and afterwards discover that it is impossible to realize, due to important protection interests.

Collect and publish information about wind resources – in order to locate the wind turbines at the best locations, seen from a comprehensive point of view.

Standardization of methods – in planning, calculation of wind energy, impact on nature etc.

Improve local involvement and acceptance by giving compensation to the local area or the municipality, and calculated in the total costs of the wind park. Another method could be to pay off the reduction in value of houses near wind farms. (Local acceptance seems to demand some sort of compensation to the nearest neighbors. Guidelines are needed for how to include this – and maybe a study on this topic should be initiated?).

Noise level. What level is acceptable? – 35, 40 or 45 dBA?  
*(Study in Halland County, Sweden, showed: 43% felt they were disturbed by "blade noise" and visual influence (within the 35-40 dbA zone). A little fewer from flicker. Proposed that the noise regulation not might be "hard" enough. In Sweden 40 dBA is the limit for houses in the "open land" – in DK and DE it is 45 dBA. Complaints are mostly not caused by "noise disturbance", but more due to the fact that neighbors do not get any compensation. Where e.g. local ownership is a part of the project, complaints are rare. An increase in the noise restrictions would make it very difficult to find sites in large parts of the North Coast regions, where there in general are very few unpopulated regions).*

Need for limiting values for flickers and shadows, caused by the turbine wings. Some of the regions have very few wind turbines and expect that the development will take place offshore.

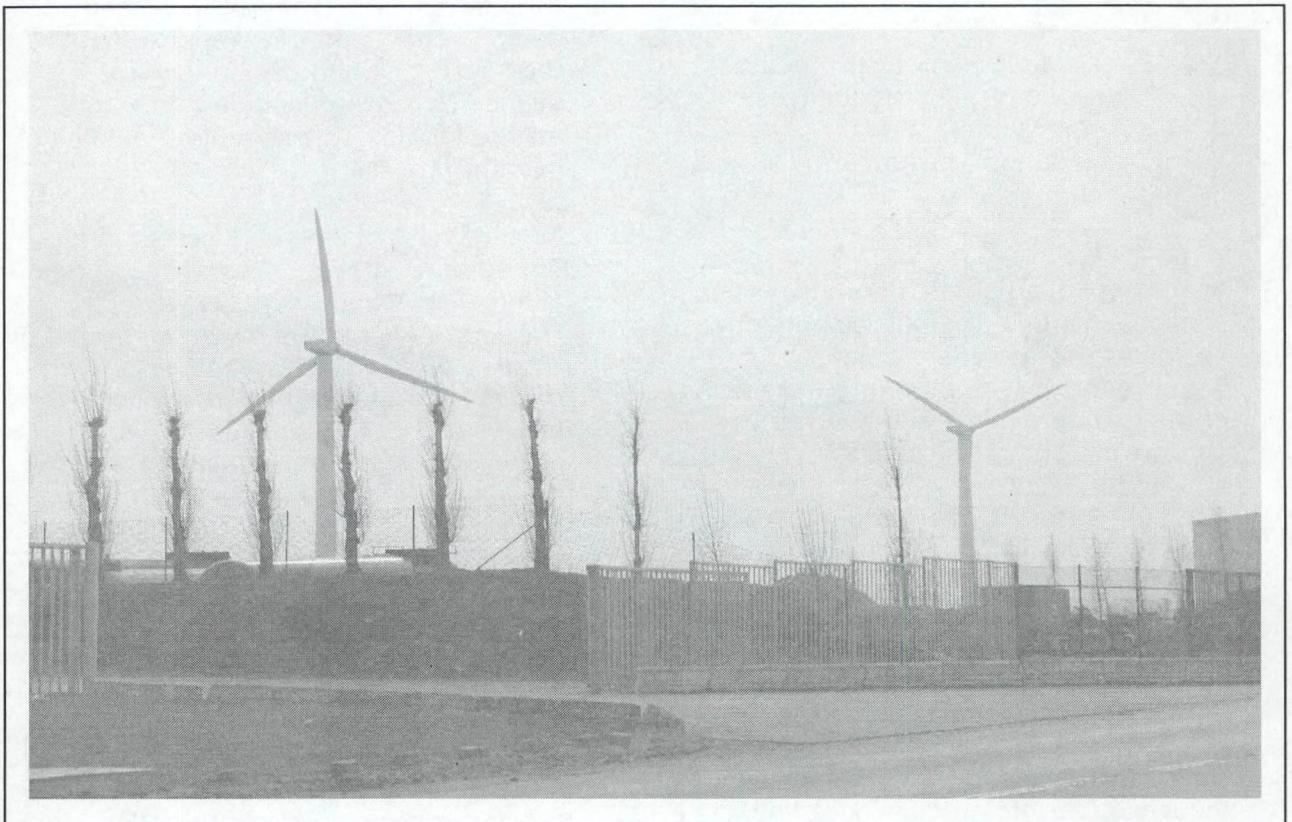
Visualizations of the wind parks are very important parts of the planning process, and guidelines in this field are needed.

What should the distance between 2 wind farms be?

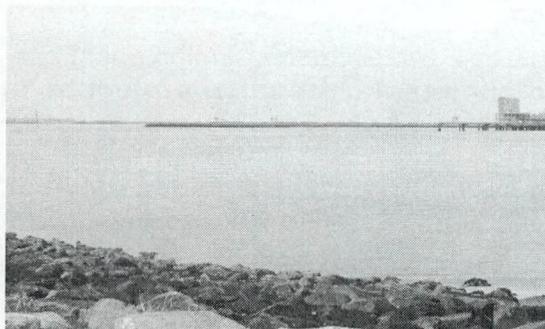
(In Denmark it has been decided, at the latest revision of planning regulations, that minimum 2.5 km distance should be kept if a documentation of the visual impact does not "convince" that it looks OK. Also a minimum distance of 4 x total WTG height to nearest neighbor were a part of these revisions. Finally, for all neighbors within 500m from nearest WTG a more comprehensive study, e.g. flicker calculation, shall be carried out.

*Tools to improve the local involvement are needed*

Need for better information on many topics. It is a new situation for the planners to deal with large wind farm projects and guidelines/experience are missing on many topics. (Development of planners "best practice" or detailed guidelines could be an important input here).



# Report Workshop C: Planning procedures Methods off shore



## **Facilitator:**

Göran Dalén, Airicole AB, Sweden

## **Rapporteur:**

Françoise Lantsoght, Province of West Flanders, Belgium

## **Situation in Sweden**

Developer looks into interesting sites and will ask for permits

- contacts local authorities
- and regional authorities
- and governmental bodies

National planning goal for wind energy (10 TWh by 2015) → regional policy → municipality policy → first draft of a general plan

→ afterwards detailed plan with Environmental Impact Assessment (EIA)

Submitted to Environmental Court (sends out EIA to several partners)

Depending how far you get away from shore: different permits and degrees of difficulty to get them.

- always: permit according to the environmental law + permit for the cable according to the electric law
- close to shore: permit by the local owner of the water
- more than 300m away: permit from the State to use the water
- less than 12 nautical miles: building permit from the municipality (local authority)

- more than 12 nautical miles: no building permit required but permit is required according to the Swedish economic zone, the continental shelf law and agreement with surrounding countries

Project of more than 10 MW:  
Environmental Court will make recommendation to Swedish government.  
Duration procedure from start to delivery of permit: 2 years (in reality it takes close to 4 years before all permits are given).

## **Situation in Belgium**

Granting a licence = competence of the federal government

2 phases :

- 1) domain concession (Royal Decree 20/12/2000)
- 2) construction & exploitation permit (Law on Protection of the Marine Environment; Royal Decree 20/12/2000)

Application for a permit → MUMM (Management Unit Mathematical Models) compulsory EIA

Minister decides on permit: for instance Seanergy got environmental permit from Minister on 25/06/2002. Although there have been some consultation rounds in coastal towns, still a lot of commotion about the planned offshore wind farm

Deficiencies :

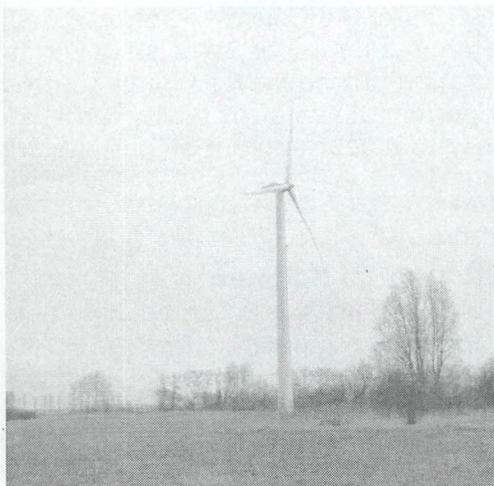
- there is no spatial planning in marine waters
- there is no legal framework
- there are no marine protected areas yet
- there is no formal involvement from the Flemish Region
- there is no structural public participation foreseen by law

## **Situation in UK**

- sectoral approach
- dealing with governmental departments (not so much local authorities)
- no spatial planning (every sector makes their own case)

### Situation in Denmark

- starting to lack space on land
- therefore growing interest offshore
- territorial waters = national property  
→ planning on governmental level  
(but: windmills on islands = regional matter)



**4) Awareness programme** should help public understand that room for new ("green", renewable) energy is an absolute necessity

5) Wish for **joined monitoring programme** (on seal/bird life)

6) Get a better understanding about **the transition of a potential project to an actual project**

7) **Look into potential added value of "artificial reefs"** (chance for new organic growth?)

### Important issues & bottlenecks

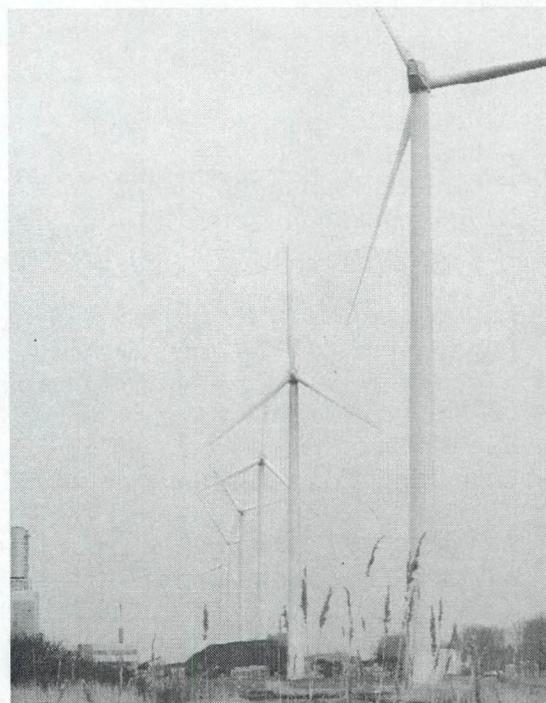
#### 1) EIA instrument: can it be used in common?

- could it be improved together (what is essence of content)?
- when is an EIA necessary?
- who does the EIA?
- who is advising the political decision-makers?
- how accountable is the EIA?
  - screening processes and scooping should be analysed on a common basis
  - need for a databank of EIA made in different EU countries → learning experience
  - problem: there is a lot of suspicion about the decision-making process

#### 2) Need for common guidelines

#### 3) Need for planning for the entire North Sea

- designation of zones (flexible spatial planning)  
but: we also have to be careful not to "kill" potential initiatives by too many regulations
- in many cases a step-by-step approach is advisable



# Report Workshop D: "Wind Energy as part of Regional Development"

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**Facilitator:**

Vivien Collie, co-ordinator, NSC Business Development Group, Scotland

**Rapporteur:**

Liesbet Lefevere, Euregio Scheldemond, Belgium



**Aim :**

To discuss how Wind Energy can be part of Regional Development  
To identify the business opportunities and employment prospects  
Identify how an area can become a centre of excellence in a multi billion euro industry.

## Session 1

**I : Personal Perspective:**

**Scotland:** Regional development and wind-farms :

Considerable interest in wind farm development in Scotland (many planning applications). But must establish:

- What are the benefits for communities?

- What are the benefits for N-Scotland?
- Should they be onshore or offshore?

**England:**

Current situation in East of England: a number of wind turbines have been introduced, but some projects turned down on bases of environmental or other criteria.

Concern amongst people: Polls show contradiction in attitude:

- don't want to spoil the landscape, prefer off-shore.
- When turbines are not there - people don't want any,
- When turbines are there, people think it's OK.
- A lot of NIMBY'ism = Not In My Back Yard.

**Identification of key themes and actions:**

|  |   |  |   |  |
|--|---|--|---|--|
| <p><b>Key ideas, issues</b></p>                      | <ul style="list-style-type: none"> <li>* Politicians have to become champions.</li> <li>* Sell the message.</li> <li>* Promotion and PR.</li> </ul> | <ul style="list-style-type: none"> <li>* Regional strategy -&gt; build industry around, strategy and targets.</li> <li>* Long term price stability for residents.</li> <li>* Enabling regional planning guidance to county structure plan &amp; local plan.</li> <li>* Need for national targets.</li> <li>* Clear guidelines as to potential sites for wind-farms.</li> </ul> | <ul style="list-style-type: none"> <li>*Community benefit should be national policy.</li> <li>* Regions should be in control of off shore (with national control on side)</li> <li>* Clearly identify local benefits.</li> <li>* Spin Offs (local networks h2 generations to drive development).</li> </ul> | <ul style="list-style-type: none"> <li>* Promote aspects of change. (landscape, environment, ecology).</li> <li>* Regional and local growth , employment possibilities.</li> <li>* Cooperating with others parties.</li> <li>* Can't all be centres of excellence (do what is appropriate to circumstances of region)</li> </ul> |
| <p><b>Main themes</b></p>                            | <ul style="list-style-type: none"> <li>* Promotion, PR required.</li> </ul>   | <ul style="list-style-type: none"> <li>* Policy strategy, guidelines and targets.</li> </ul>   | <ul style="list-style-type: none"> <li>* Local communities must benefit.</li> </ul>   | <ul style="list-style-type: none"> <li>* Networks and cooperation.</li> </ul>  |
| <p><b>NSC role in future, action to be taken</b></p> | <ul style="list-style-type: none"> <li>*Inform politicians and define priorities.</li> </ul>  | <ul style="list-style-type: none"> <li>* Need for clear overview.</li> </ul>   | <ul style="list-style-type: none"> <li>* More work required to promote the potential benefits to local communities.</li> </ul>  | <ul style="list-style-type: none"> <li>* Need to share best practice.</li> </ul>   |

## Session 2:

### I : Personal Perspective:

**Belgium:** Example of an Environmental Impact Assessment: What would be the socio-economic effect of the installation of 14 turbines in Zeebrugge?

- **Aspects of research:** Effect on Tourism, Industrial port activity and fisheries.

*Employment:*

- 1 full time equivalent extra maintenance

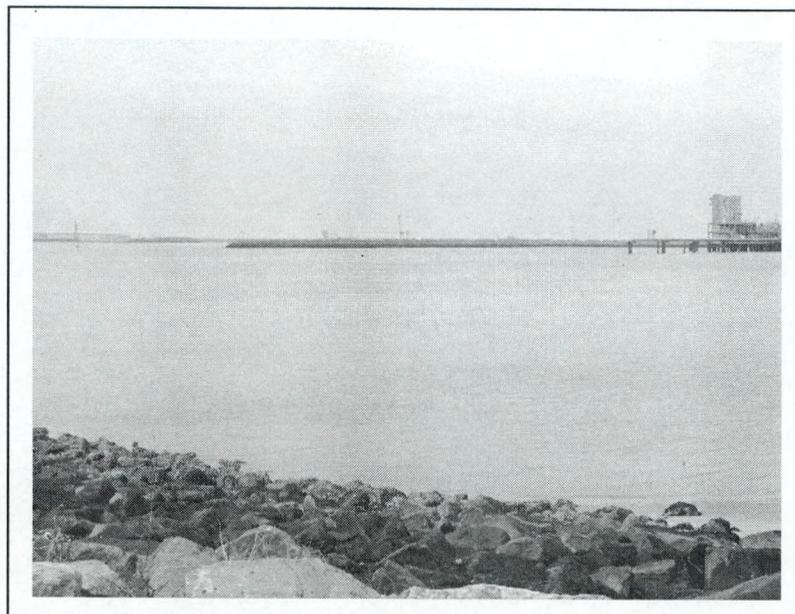
**England:** Promotion of wind farms in UK.  
Selling Arguments:

- Creation of jobs. (But locally less effect).
- Local share-ownership.
- Constant source of electricity
- Bring skills and experience available in those sectors in decline into wind industry sector. E.g. Fisheries, oil and gas industry.
- Combination of tourism and wind-farm industry. E. g. visitor centres.

- **Method:** Surveys measuring attitude towards green energy.
- **Target group:** residential tourists, tourists, inhabitants.
- **Some Findings:**

*Tourism:*

- Preference for off-shore wind-farms.
- Tourists are more positive towards wind farms than inhabitants are. (40% of the inhabitants think that quality of life would be influenced negatively.)
- General Conclusion: Low effect on Tourism.
- 1 full time equivalent extra construction
- Consultancy, etc...



**Identification of key themes and actions:**

|  |  |  |  |
|--|--|--|--|
| <p><b>Key ideas, issues</b></p>                      | <ul style="list-style-type: none"> <li>* Financial returns should be ploughed back into local areas, not spread throughout the region.</li> <li>* Public involvement in planning.</li> <li>* Public ownership. (equity, profit sharing)</li> <li>* Taxes.</li> <li>* Local production.</li> <li>* Tourism.</li> <li>* Maintenance (road building).</li> <li>* Involvement of local skills.</li> <li>* Financial participation.</li> <li>* Maximum local benefit (micro economy)</li> </ul> | <ul style="list-style-type: none"> <li>* Wind-farms local issues should be decided locally and not by regional government.</li> <li>* If regional Co2 reduction targets, it makes sense to have renewable energy targets for regions.</li> <li>* Good decision procedures, incl. public participation.</li> <li>* Common planning guidelines/rules.</li> <li>* Information to the public (spatial plan, details of max .density in a region).</li> <li>* Better off-shore than on-shore (assuming that region has shoreline).</li> <li>* Need for a national plan /framework.</li> </ul> | <ul style="list-style-type: none"> <li>* More research and availability of data (no biased data).</li> <li>* Lack of knowledge and awareness about energy +education.</li> <li>* Integrated approach with combination of education, info, link with other renewables.</li> </ul> |
| <p><b>Main themes</b></p>                            | <ul style="list-style-type: none"> <li>* Must identify Community benefits (local and regional).</li> </ul>   | <ul style="list-style-type: none"> <li>* Need comprehensive planning and clear framework.</li> </ul>   | <ul style="list-style-type: none"> <li>* Require a holistic approach to renewable energy.</li> </ul>   |
| <p><b>NSC role in future, action to be taken</b></p> | <ul style="list-style-type: none"> <li>* Promote, gather and share experience of good projects.</li> </ul>   | <ul style="list-style-type: none"> <li>* Get governments to understand the need for clarification on wind energy developments.</li> </ul>  | <ul style="list-style-type: none"> <li>* Produce recommendations on wind energy development.</li> </ul>  |

Facts and Figures, employment effects:

**To be a centre of excellence in this industry an area requires:**

- Good logistics and communication links
- Skilled labour force (e.g. manufacturing and construction)
- Low labour costs
- A market for green energy
- Indigenous resources (e.g. wind)
- Relevant technology
- Good asset management

**Business sectors involved in the Wind Energy industry:**

- Manufacturing
- Consultancy
- Research and development
- Project developers, owners and operators
- Construction engineering services
- Operation and maintenance engineering services
- Finance, planning and professional services
- Education services
- Sales, marketing and PR services
- Government and statutory bodies, trade organisations etc
- Protective services

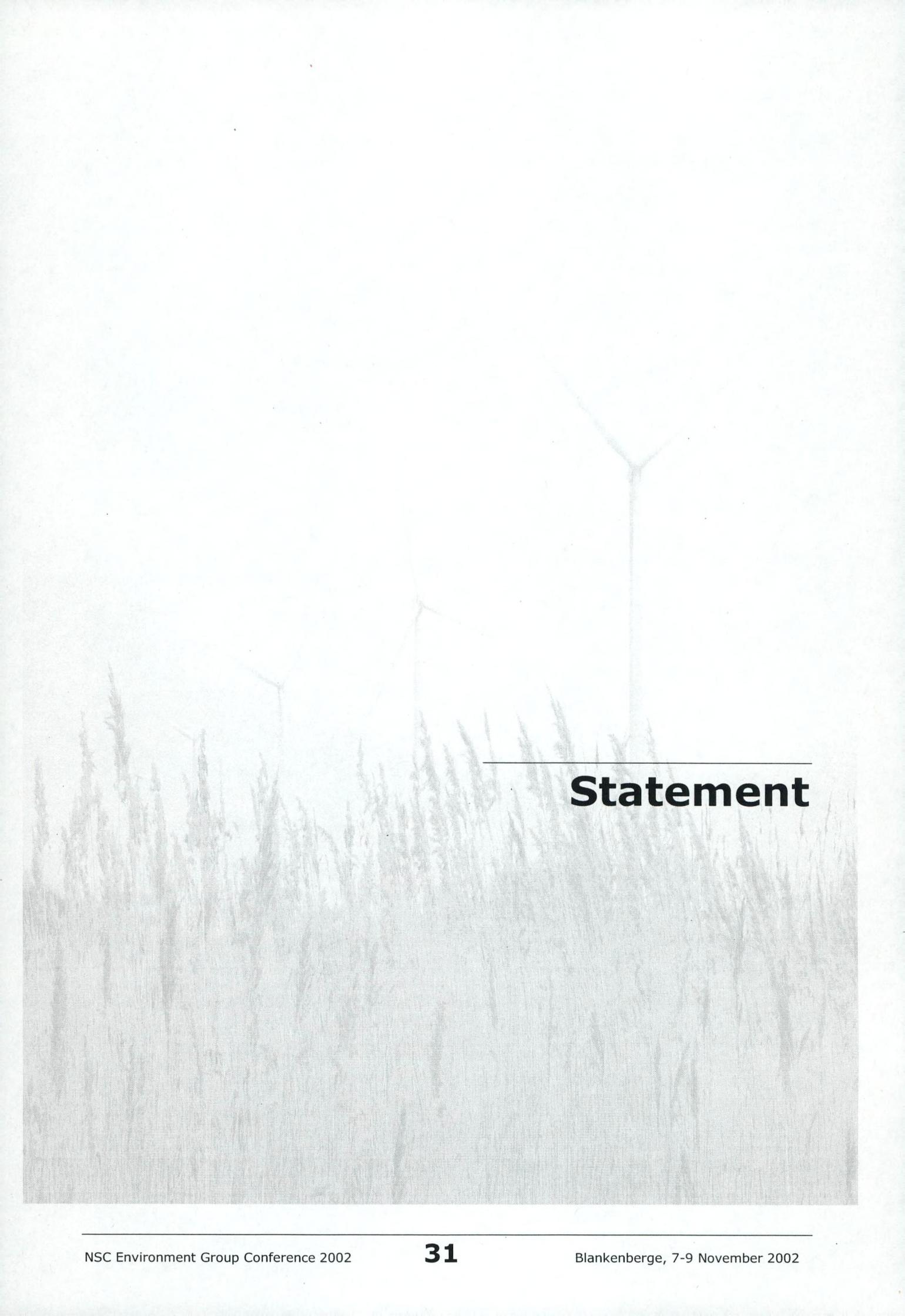
**Types of occupation provided by the Wind Energy sector:**

- Professional
- Managerial
- Administration
- Clerical and secretarial
- Craft and skilled trades
- Technical professions
- Plant and machine operators
- Sales

**Supply chain opportunities in the Wind Energy sector.**

- Consultancy - development, planning, noise, energy, site design, ecology, etc
- Components - steel fabricators, glass fibre, electrical
- Turbine manufacture, supply, installation
- Civil and electrical works
- Research and development





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# Statement

The NSC Environment Group Conference 2002 resulted in the following statement:

### **Implementation of Renewable Energy**

The Bergen Declaration, from the 5th North Sea Conference 2002, made renewable energy one of its main issues. As a complement to the declaration the following statement has been made from the Annual Meeting of the North Sea Commission Environment Group in Blankenberge, Belgium, 7th-8th of November 2002.

In a situation where the EU is very much depending on imported fossil fuel as an energy source and is expected to be even more so – estimated to 70% in 2010 – more emphasis has to be made on the implementation of renewable resources. The conference concentrated on land and off shore wind energy planning and decision making process, and included the extensive experience in Denmark.

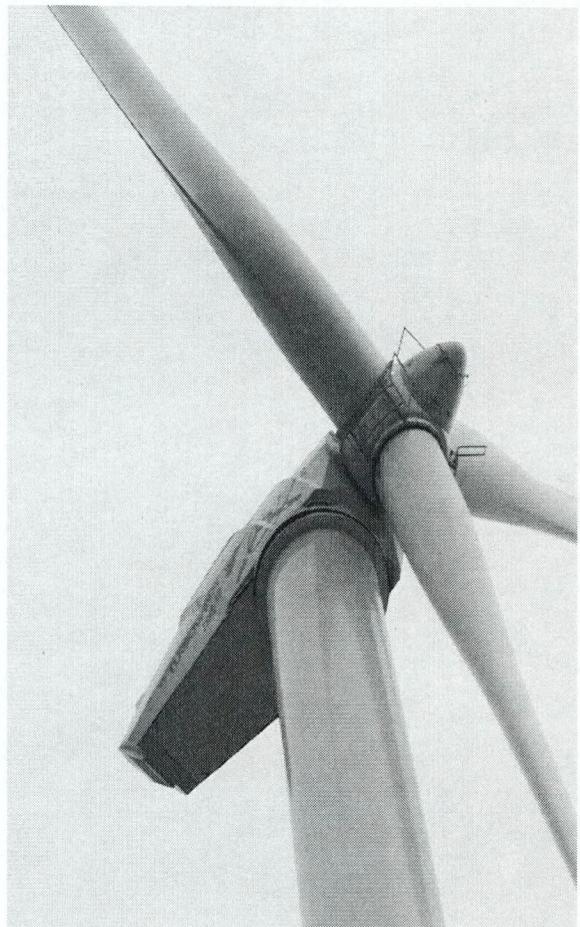
Implementation of national policy and decisions needs influence, active dialogue and involvement of the local and regional level. The planning situation around the North Sea is varied, but all regions see the need to have active dialogue with the national level to clarify the circumstances for the development.

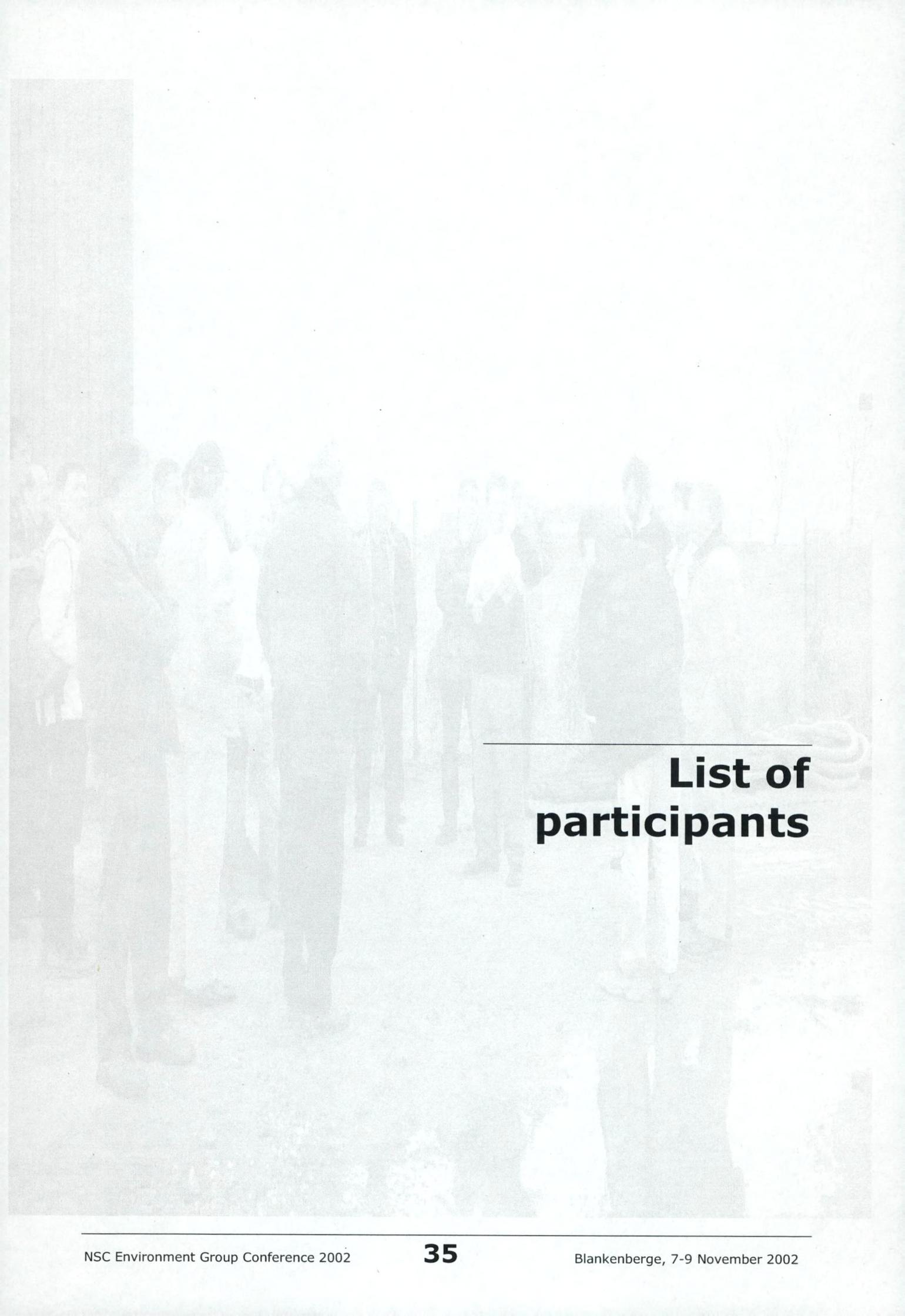
Best practice in implementation of wind energy clearly shows the need of participation from the public in the early stages of planning and decision-making process. Otherwise, it can easy be problem with the acceptance from the public. Experience also shows the importance of development giving some sort of benefit to the public and local society.

The conference calls for co-operation between national governments and between government and regional authorities to create a set of criteria for the planning and development of the wind energy around the North Sea.

The NSC Environment Group is sending this statement to the NSC Executive Committee for further action, stressing the great importance of getting the right

planning and decision-making process. Otherwise we will not use the possibilities which renewable resources give.





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**Enclosed**

MIDDELGRUNDEN 40 MW WIND FARM

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ABSTRACT:

The paper describes the model for public involvement, based on experience from offshore projects in Denmark. The paper is based on the experience gained during the establishment of the World's largest offshore wind farm Middelgrunden, 40 MW established 3.5 km outside Copenhagen harbour on shallow water (3-8 meters deep) in the autumn of 2000. It is concluded that although active public involvement is a time and resource requiring challenge, it is to be recommended as it may lead to mitigation of general protests, blocking or delaying projects, and increase future confidence, acceptance and support in relation to the coming offshore wind farms in Europe. The experiences from the planning of the project is summarized, and the perspectives for the future development of offshore wind power in Europe are drawn.

Key words: wind turbine, cooperative, economic, offshore, energy, environment, public awareness, renewable.

1 INTRODUCTION

In Denmark many people are involved in wind energy projects, approximately 150,000 families, due to environmental concerns and/or the possibility of receiving some financial benefits.

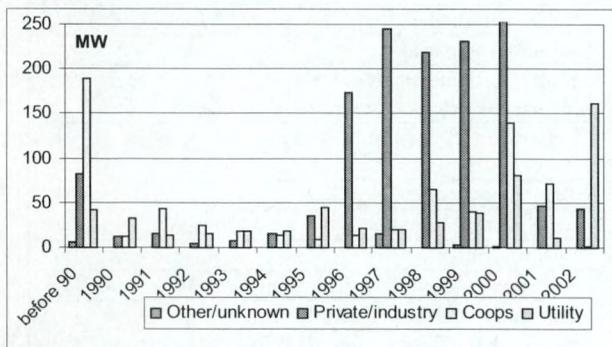


Figure 1 Development in ownership of wind farms in Denmark MW installed power each year [13]

The cooperatives, where mostly local people share expenses and income from a wind turbine, have played an important role, especially providing acceptance at a local level, where the possibility of resistance is otherwise high due to visual or noise impacts.

In general there is a broad acceptance to wind energy in Denmark – opinion polls result in at least 70% being in favour of wind energy, whereas about 5% are against.

Regarding offshore, the farms established in the 1990-ies at Vindeby and Tunoe Knob are utility owned, whereas the Middelgrunden is owned 50% of the local utility and 50% of a cooperative.

The involvement of the public regarding Vindeby and Tunoe was based basically on the information approach, whereas a much more active information and participation strategy was used and needed at Middelgrunden, as described below.

2 THE MIDDELGRUNDEN PROJECT

The Middelgrunden Wind Farm has a rated power of 40 MW and consists of 20 turbines each 2 MW. The farm was established during year 2000 and is the world's largest offshore wind farm. The farm is owned partly by the Copenhagen Utility and partly by a cooperative with 8,552 members. The farm delivers more than 3% of the power used in Copenhagen [5] and [6].

The wind farm is situated on a natural reef 3.5 km east of the Copenhagen harbour. The reef has for more than 200 years been used as dumpsite for harbour sludge and other contaminated waste. Special environmental concern has been taken and feasibility studies have been carried out [1], [2], [3], [4], [5] and [7].

An old dry dock of a former shipyard was used for casting the concrete gravity foundation. The foundation together with the lower section of the turbine tower, the transformer and switchgear were floated out to the site in the autumn of 2000. The abandoned shipyard was also used for assembling the rotor, which together with the upper section of the tower and the nacelle was floated out on a barge. For positioning of the turbine a jack up platform was used (see [6], [7] and [16]).

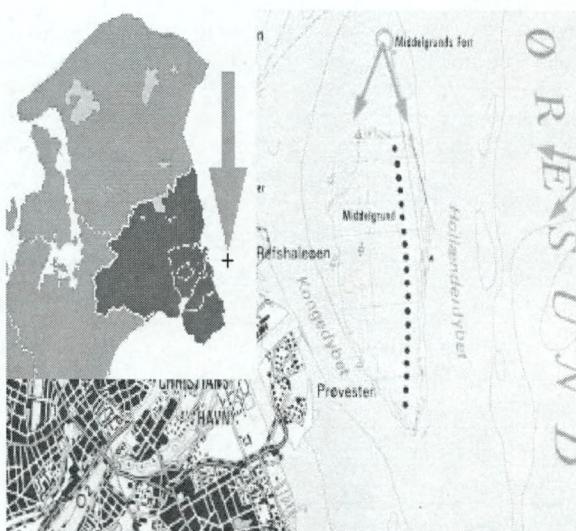


Figure 2 The location of the Middelgrunden Wind Farm east of Copenhagen harbour.



**Figure 3:** The Middelgrunden Wind Farm.

**Table I** Facts about the Middelgrunden Wind Farm [6] and [9]

|                           |              |
|---------------------------|--------------|
| Power                     | 40 MW        |
| Hub height                | 64 meter     |
| Rotor diameter            | 76 meter     |
| Total height              | 102 meter    |
| Foundation depth          | 4 to 8 meter |
| Foundation weight (dry)   | 1,800 tons   |
| Wind speed at 50-m height | 7.2 m/s      |
| Estimated power output    | 89 GWh       |
| Park efficiency           | 93 %.        |

**Table II** Partners involved

|                            |                           |
|----------------------------|---------------------------|
| Owner 10 turbines north    | Copenhagen Energy         |
| Owner 10 turbines south    | Middelgrunden Cooperative |
| Project management         | SEAS, Wind Energy Center  |
| assisted by                | SPOK ApS (EMU)            |
| Design                     | Moeller & Groenborg       |
| Structural design          | Carl Bro as               |
| Manufacturer of turbines   | Bonus Energy A/S          |
| Contractor, foundation     | Monberg & Thorsen A/S     |
| including sea work         | & Pihl & Soen A/S         |
| Contractor, sea cable      | NKT Cable A/S             |
| Switchgear and transformer | Siemens A/S               |

**Table III** Budget of the wind farm, grid connection from land to the farm not included [7] and [8]

| The total investment in the project                                      | EUR (mill)  |
|--|-------------|
| Wind turbines  | 26.11       |
| Foundations including changes after the tender to reduce the time on sea | 9.92        |
| Grid connection, off-shore   | 4.56        |
| Design, advice and planning  | 2.15        |
| Wind turbine cooperative   | 0.54        |
| Other costs  | 1.61        |
| <b>Total</b>   | <b>44.9</b> |

### 3 HISTORY AND IMPORTANCE OF THE COOPERATIVE

In 1996, the Copenhagen Environment and Energy Office (CEEEO) took the initiative to organize the project, after the location of Middelgrunden had been pointed out as a potential site in the Danish Action Plan for Offshore Wind [10]. Together with CEEEO a group of local people formed the Middelgrunden Wind Turbine Cooperative and a cooperation with Copenhagen Energy was established. As the Municipality of Copenhagen owns Copenhagen Energy, a close link to politicians was thereby also established. The locally based commitment, along with cooperation between the cooperative, the local utilities, and the municipality of Copenhagen, constituted a significant precondition for the development of the project. The project was subject of a long and intensive hearing phase, as can be seen from table 4.

The original project dating back to 1997 consisted of 27 turbines placed in three rows. After the public hearing in 1997, where this layout was criticised, the farm layout was changed to a slightly curved line and the number of turbines had to be decreased to 20 [4], [11] and [12].

**Table IV** Process of the establishment of Middelgrunden offshore wind farm [1], [6], [7]

|  |                          |
|--|--------------------------|
| Application on principal approval  | September 1996           |
| First public hearing, 27 turbines  | June – Sep 1997          |
| Second public hearing, 20 turbines   | June – Sep 1998          |
| Principal approval   | May 1999                 |
| Third public hearing (Environmental Impact Assessment report)                  | July – Oct 1999          |
| Final permit from Danish Energy Agency   | December 1999            |
| Contracts signed   | December 1999            |
| Construction initiated   | March 2000               |
| Casting concrete   | April - July 2000        |
| Starting work on seabed  | May - June 2000          |
| Placement of gravity foundations including the first 30 m section of the tower | October - November 2000  |
| Placement of the sea cables between the turbines                               | November                 |
| Placement of the upper part of the turbine including rotor                     | November - December 2000 |
| First turbines start production  | December 2000            |
| Commissioning  | March 2001               |

The authorities raised a number of questions that were answered during the publicly funded pre-investigations. During the hearing in 1997 24 positive and 8 critical answers were received:

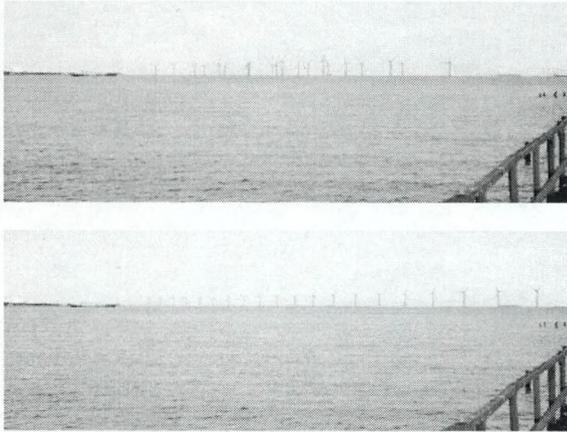
Behind these figures, a comprehensive information work is hidden, both in relation to relevant authorities and NGO's and in relation to the many future shareholders in the cooperative.

For instance, locals were worried about potential noise impact from the farm, but after a demonstration tour to a modern on-shore wind turbine, the locals were convinced that there would be no noise impact from the Middelgrunden turbines.

Information to the potential shareholders was in the beginning primarily carried out with the purpose of securing a sufficient number of pre-subscriptions. This turned out to be a success, and the interest of more than 10,000 local people was a proof of a strong local support, which could be useful in the approval phase.

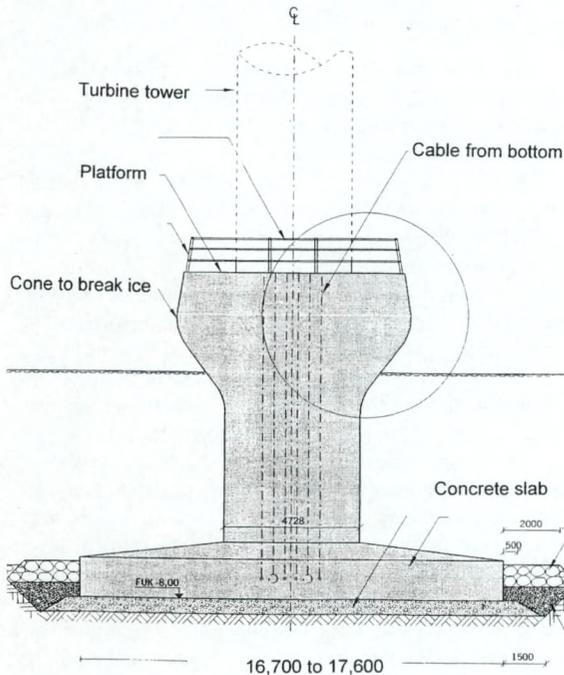
A part of the shareholders got involved in the democratic hearing process, which was intended to create the foundation for authorities' approvals.

As an example the Danish Society for the Conservation of Nature at first decided to reject the proposed location, but through involvement of and information directed at the local committees of the society, this decision was later changed.



**Figure 4** The Middelgrunden “27 turbine sin three rows” and “20 turbines in a curved line” from the beach at Kastrup [11] and [12]

At the final hearing a large number of local groups and committees, not mentioning the several thousand shareholders, recommended and supported the project – only a relatively small group of yachtsmen, fishermen, individuals and politicians remained in opposition.



**Figure 5** The actual design of the concrete gravity foundation. The height of the total foundation is between 11.3 and 8 m. Measures in mm. [7] and [15]

During and after the construction there has been surprisingly little resistance to the project, considering the visual impact from the large turbines, located just 2 – 3.5 km away from for instance a very popular recreational area – a beach – near Copenhagen. The reason for this lack of protest is believed to be the strong public involvement, both financially and in the planning phase.

#### 4 THE UTILITY

In 1996 the Copenhagen Energy took the first step to investigate the feasibility of an offshore wind farm at Middelgrunden, too.

The Municipality of Copenhagen owns<sup>1</sup> the Copenhagen Energy. After 2 years of negotiations and overcoming political differences, a contract between the cooperative and utility was established in 1998.

The Wind Energy Centre at the utility SEAS acted as consultant for the Copenhagen Utility, and was heading the project organization for the establishment of the wind farm.

It is the evaluation that both parties (cooperative and utility) have gained from the arrangement. The Utility possesses the big organization for questions about technique, contractor work, etc. The wind cooperative has the knowledge from the private wind sector, with enthusiasm and commitment as well as better contacts with the public and the press. The locally based commitment, along with cooperation between the cooperative, the local utilities, and the municipality of Copenhagen, constituted a significant precondition for the development of the project. This cooperation has provided credibility to the project in relation to politicians and the public.

#### 5 THE FINANCING OF THE COOPERATIVE

The cooperative’s part consists of 40,500 shares. One share represents a production of 1,000 kWh/year, and is sold for 4,250 DKK (567 EUR). All shares were paid up front in order to follow the constitution of the cooperative.

By now, more than 8,500 people, primarily in the local area, have joined the cooperative. By October 2000, 100 % of the private shares were sold. The cooperative is the world’s largest wind turbine cooperative. The project will be the largest wind farm worldwide based on dual ownership and the largest offshore wind farm in the world.

**Table V** Sales price of electricity delivered to the grid from the Middelgrunden Wind Farm [5]

| Year  | Fixed price  | Added price for renewable energy               |
|-------|--------------|--|
|       | EUR/kWh      | EUR/kWh  |
| 0-6   | 0.044        | 0.036  |
| 6-10  | 0.044        | 0.013  |
| 10-25 | Market price | RE certificate* to be traded<br>0.013 to 0.036 |

\* All Danish electricity consumers are by 2005 obliged to buy renewable energy (RE) certificates.

In the beginning, only people from the municipal area could buy shares (equivalent to 1,000 kWh/year). In 1999, new regulation came into effect and all Danish people could buy shares. The newest development in year 2000 was that all people also outside Denmark could buy it within certain conditions. Today only about 100 shares are owned by people from outside Denmark.

<sup>1</sup> In 2001 the Copenhagen Utility has merged with SK-Energi covering most of the energy production in the eastern part of Denmark.

**Table VI** Key figures for production based on budget, interest rate 5% and 20 years lifetime, [5] and [8]

|  |                |
|--|----------------|
| <b>Production price of electricity</b> | 0.046 EUR/kWh  |
| of which service                       | 0.009 EUR/kWh  |
| Investment/kW                          | 1.14 EUR/kW    |
| Yearly production                      | 89,000,000 kWh |

**Table VII** Economy for a typical shareholder [5] and [8]

|   |                 |
|---|-----------------|
| Jensen family bought 1 share (1,000 kWh/year)                               |                 |
| Price of the share is 4,250 DKK<br>(172 mill DKK/40,500 shares = 4,250 DKK) |                 |
| Selling price of electricity  | 330 DKK         |
| RE certificate (max, see table 5)   | 270 DKK         |
| Income/year   | 600 DKK         |
| Maintenance cost  | -70 DKK         |
| Net income/year   | 530 DKK         |
| Rate 530/4,250  | 12.5%           |
| Simple pay back time  | 8 years         |
| Calculated lifetime   | 20 years        |
| 5% yearly depreciation  | 212.50 DKK/year |
| Income after depreciation   | 317.50 DKK/yr   |
| Rate after depreciation   | 7.5%            |

**Table VIII** Financing of the project [5] and [8]

| When    | Activity   | Funding M € |         |
|---------|--|-------------|---------|
|         |  | Public      | Project |
| 12-1996 | Information prospect   | 0.01        |         |
| 03-1997 | 1st feasibility<br>Killer assumptions                            | 0.15        |         |
| 05-1997 | Cooperative formed<br>Advertising 7 €/share                      |             | 0.13    |
| 08-1997 | 1st public hearing<br>Visualisation 1                            | 0.04        |         |
| 11-1997 | 2nd feasibility<br>- engineering, design<br>- soil investigation | 0.40        |         |
| 08-1998 | 2nd public hearing<br>- visualisation 2                          | 0.05        |         |
| 01-1999 | Pre-qualification  |             | 0       |
| 05-1999 | Planning permission  | 0.01        |         |
| 06-1999 | Detailed Project   |             | 0.27    |
| 07-1999 | Environmental Impact<br>Assessment                               | 0.07        |         |
| 08-1999 | Soil investigation CPT   |             | 0.06    |
| 10-1999 | Tender   |             | 0.12    |
| 11-1999 | 2 boreholes  |             | 0.05    |
| 11-1999 | 25 % Payment shares  |             | 4.3 *   |
| 12-1999 | Permission   |             | 0.01    |
| 12-1999 | Contact contractors  |             | 5.0 *   |
| 09-2000 | 100 % Payment shares   |             | 17.2 *  |

Under financed

\* 50 % total cost

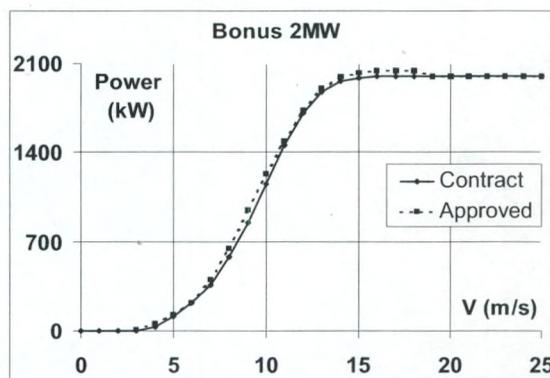
Number of shares is based on 50 % of 81,000 MWh = 90 % of 89,000 MWh = guaranteed production

## 6 LESSONS LEARNED

During the approval process, authorities raised a number of questions, that were answered through the carefully planned pre-investigations.

Dialogues with many kinds of interest groups, CEEO and the Middelgrunden Wind Turbine Cooperation, with its 8,553 members, generated a widespread understanding for and social acceptance of the chosen location and layout of the farm.

Locally based commitment and cooperation between the cooperative, the local utility, and the municipality of Copenhagen has been a significant precondition for the development of the project.



**Figure 6:** Power curve for the 2 MW turbines based on 1 year production. Production figures can be found on [www.middelgrund.com](http://www.middelgrund.com). The information is updated every 10 minutes

This cooperation has provided credibility to the project in relation to politicians, press, public etc. The municipality's role in the project has mostly been political, through the local parliament commitment to the project as such, and through the preparation of the terms of collaboration between the utility and the cooperative.

## 7 FUTURE OFFSHORE WIND PROJECTS IN DENMARK

Currently two private projects are planned, along with the five 150 MW demonstration projects [10]. Two of the 150 MW projects: Horn Rev and Nysted (Roedsand) are under establishment.

Of the two private projects, the one at Grenaa is owned by a private developer and has been delayed due to much local resistance.

The other private project, the 25 MW project at Samsøe (10 turbines), is owned by shareholders, consisting of local people and neighbouring municipalities. The farm will be established in the autumn of 2002, and because of the direct public involvement in the preplanning phase and the financial participation, the project has to date not been the focus of any major protests.

The coming three 150 MW offshore demonstration farms were intended to be utility owned, but as the utilities have seen the advantages of public involvement, they have agreed upon a plan drawn up by the Danish Association of Turbine Owners, including public financial participation. This agreement however has not been politically approved yet, and the Government has recently postponed the time for the establishment of the farms as Denmark already today has reached the goal for renewable energy based power for the year 2005.

In Sweden good acceptance from local society has been obtained without public ownership [7], [18].

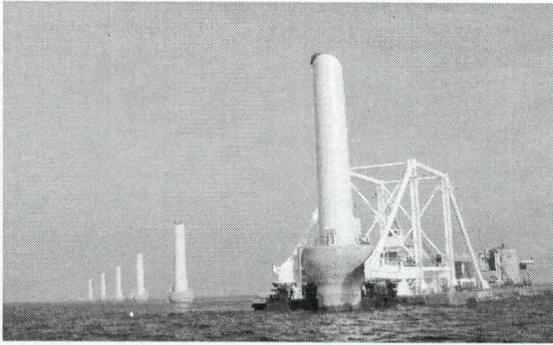


Figure 7: The floating crane with a foundation and the lower part of the tower at the site just before placing

## 8 CONCLUSIONS

An open public dialogue already from the very beginning of a planning phase is crucial for achieving social acceptance – and the social acceptance on the other hand may influence political decisions.

Direct public involvement, e.g. the cooperative ownership model, is an important mean for social and political acceptance, but may influence strongly on decisions taken during the planning phase, which must be accounted for in the pre-planning phase as even minor deviations in the work at sea have a disproportional large effect on the time schedule.

There is today no clear overview on the results of different strategies for public involvement and conflict management. This is a subject that deserves to be studied in more detail, through a monitoring programme focusing on public acceptance before and after the installation of an offshore wind farm in relation to the degree of public involvement and active conflict management [17].

The future large deployment of offshore wind in Europe where the increase within 5-10 years will be 50 to 100 times the installed capacity of today [14] and [18] calls for intensive work with different models for public acceptance. Cooperative ownership has in Denmark proved to be one successful model.



Figure 8: The switchgear and transformer on top of the concrete foundation ready for placement of the tower

## 9 ACKNOWLEDGMENT

The extensive pre-study of the Middelgrunden wind farm project has only been possible because of support from the Danish Energy Agency under the special scheme supporting private cooperatives to participate in the development of offshore wind farms.

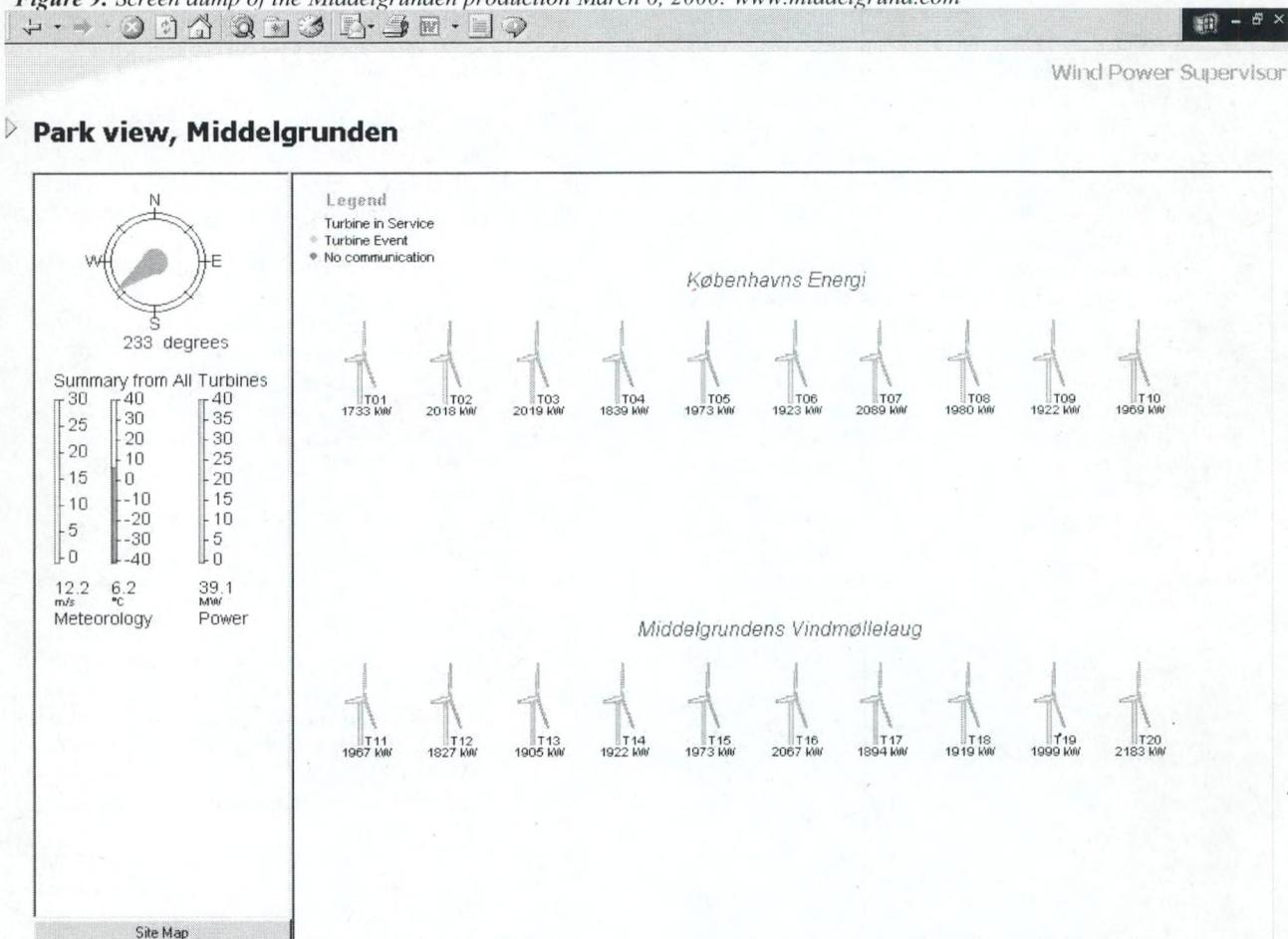
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- The Danish wind industry: [www.windpower.dk](http://www.windpower.dk)
- The Danish Energy Agency: [www.ens.dk](http://www.ens.dk)
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- The foundation contractor: [www.monthor.dk](http://www.monthor.dk)
- The grid connection: contractor. [www.nkt.dk](http://www.nkt.dk)
- The EU Concerted Action: [www.offshorewindenergy.org](http://www.offshorewindenergy.org)
- Wind force 10 [www.ewea.org/src/information.htm](http://www.ewea.org/src/information.htm)
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- Energi- & Miljø Data: [www.emd.dk](http://www.emd.dk)
- The Horns Rev project: [www.hornsrev.dk](http://www.hornsrev.dk)
- The Grenaa project [www.worldwidewind.com](http://www.worldwidewind.com)

**Figure 9:** Screen dump of the Middelgrunden production March 6, 2000: [www.middelgrund.com](http://www.middelgrund.com)



## EXPERIENCE WITH AND STRATEGIES FOR PUBLIC INVOLVEMENT IN OFFSHORE WIND PROJECTS

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### ABSTRACT:

The paper describes and analyses different models for public involvement, based on experience from offshore projects in Denmark (especially Middelgrunden) and Sweden (Karlskrona Vindkraft Offshore). The public likely to be concerned by offshore wind energy projects must be informed and consulted as part of the Environmental Impacts Assessment (EIA). However, as member states individually define details regarding information and consulting, different approaches are possible. It is concluded that although active public involvement is a time and resource requiring challenge, it is to be recommended as it may lead to mitigation of general protests, blocking or delaying projects, and increase future confidence, acceptance and support in relation to the coming offshore wind farms in Europe.

### 1 INTRODUCTION - LEGAL FRAMEWORK

Most EU member states have planning requirements that play an important part in the national development of wind power sites. However, the requirements for wind energy proposals vary between the member states. In some countries, legislation has been passed at a national level enabling the authorities to request a submission of an Environmental Impact Statement (EIS) of wind power developments.

The term "Best Practice Guidelines" has been adopted in many member states in order to describe the best and most appropriate approach for development, operation and decommissioning of wind energy projects.

These Best Practice Guidelines may very well assist any assessment procedure in addressing, not only the technical, commercial and environmental aspects of projects, but also the social impacts.

#### 1.1 EIA

Private and public projects that are likely to have significant effects on the environment must be subject to an Environmental Impact Assessment (EIA) before they can be allowed to proceed. All offshore wind projects are therefore expected to be subjects of an EIA.

The main purpose of the EIA is to examine, in detail, the impacts of the project, and this also includes a requirement for public participation [1].

The public that is likely to be concerned about a project must be informed and consulted, but each member state defines individually the details of these arrangements, resulting in numerous potential approaches.

Although national relevant authorities have the responsibility to safeguard that these consultations are carried out in an appropriate and sufficient way, often the process of information and consultation is carried out by the developer without any involvement from the responsible authority.

In the EIA also the true potential of the project lays hidden. Hence, the relevant issues of an EIA will prove to be relevant also to the decisions made during the planning phase of a project. If the scope of an EIA also covers social impacts of a development, this will prove to be an important foundation for a dialogue with the con-

cerned population. Even better, there will be an understanding of what population might be concerned about when it comes to offshore wind power locations. It should be known who to address, when to address and how to address. If there is no understanding of the local social contexts and important issues for the concerned population, this cannot be known.

An EIA might prove to be the foundation needed for the appropriate adjustment of the project to the prevailing circumstances. Hence, it is not only supposed to be a document (EIS) presented to the authorities, but a dynamic process, a framework and tool for the project development. An EIA involves a flexible procedure where amendments to the original proposal constantly are weighed against all different aspects of the project. Mitigation is discussed in order to arrive at the most acceptable form of development. It is impossible to understand which mitigation measures that are relevant, if there is no open dialogue between different concerned parties.

#### 1.2 Public participation

There are different forms of public participation, but basically the public can be involved in a project in three major ways, [2], [3] and [4]:

- through information about ongoing development (information),
- through involvement in the decision making process (planning participation),
- through financial involvement in the project (financial participation).

The most common approach is to quite passively inform people and carry out the minimum requirements regarding consultation. People are almost never offered a direct influence on the decision making.

This is due to imagined disadvantages and misconceptions, mainly such as [3]:

- public participation may worsen the situation,
- public participation might be inefficient,
- it is impossible to satisfy all interests so you might as well not try,
- public participation may expand the scope of the conflict.

However, if the channels for a dialogue are kept open and looked after, potential threats can be mitigated before a more general protest is formed. There will be a sense of control over the development of the project and the dialogue with the concerned public will not be handed over to misinformation by media. If a sense of control is created through an open and dynamic dialogue, the confidence of the public can be achieved. This is a very efficient way to navigate towards not only a successful outcome of a project but also future confidence in wind energy developments, and perhaps even more important in wind power developers.

The advantages of public participation may include:

- an essential improvement of planning decisions and balancing of different aspects,
- increased awareness of public concerns,
- an increased understanding of possible cooperation between opposing parties,
- elimination of misinformation and believed threats,
- future confidence and acceptance.

### 1.3 Conclusion

If multiple parties are involved in the decision making, the social and environmental impacts can be properly addressed and the conflicts reduced. Conflicting interest are illuminated in a pedagogic way early in the process. This improves the possibilities to compare facts such as the pros and cons of wind energy in relation to the effects of other energy sources. People who tend to accept the process also tend to accept its outcome [5].

## 2 EXPERIENCE FROM DENMARK

### 2.1 Introduction

In Denmark many people are involved in wind energy projects, approximately 150,000 families, due to environmental concerns and/or the possibility of receiving some financial benefits.

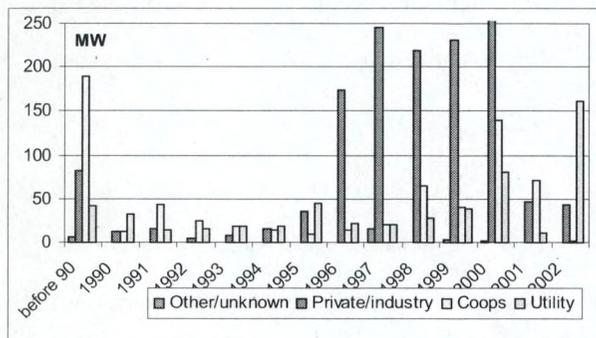


Figure 1 Development in ownership of wind farms in Denmark MW installed power each year. [12]

The co-operatives, where mostly local people share expenses and income from a wind turbine, have played an important role, especially providing acceptance at a local level, where the possibility of resistance is otherwise high due to visual or noise impacts.

In general there is a broad acceptance to wind energy in Denmark – opinion surveys result in at least 70% being in favour of wind energy, whereas about 5% are against. Regarding offshore, the farms established so far at Vindby and Tunoe Knob are utility owned, whereas the

Middelgrunden is owned 50% of the local utility and 50% of a co-operative.

The involvement of the public regarding Vindby and Tunoe was based basically on the information approach, whereas a much more active information and participation strategy was used and needed at Middelgrunden, as described below.

### 2.2 The Middelgrunden project

The project consists of twenty 2 MW Bonus turbines, half of them owned by the Middelgrunden Wind Turbine Cooperative. 8,500 people, primarily in the local area, have joined the co-operative, which makes it the world's largest wind turbine cooperative, typically investing 2,850 EUR, corresponding to the production of 5,000 kWh/year.

The farm was constructed in 2000 (see table 1) and from March-October 2001 the production has been app. 50.000 MWh. In [5] and [6] details regarding technical and financial aspects are presented concerning the construction of the farm.

#### History and importance of the co-operative

In 1996, the Copenhagen Environment and Energy Office (CEEEO) took the initiative to organize the project, after the location of Middelgrunden, 3 km from Copenhagen harbour, had been pointed out as a potential site in the Danish Action Plan for Offshore Wind [9]. Together with CEEEO a group of local people formed the Middelgrunden Wind Turbine Cooperative and a cooperation with Copenhagen Energy was established. As the Municipality of Copenhagen owns Copenhagen Energy, a close link to politicians was thereby also established. The locally based commitment, along with co-operation between the co-operative, the local utilities, and the municipality of Copenhagen, constituted a significant precondition for the development of the project.

The project was subject of a long and intensive hearing phase, as can be seen from table 1.

|   |                |
|---|----------------|
| Application on principal approval                           | September 1996 |
| First public hearing , 27 turbines                          | Jun – Sep 1997 |
| Second public hearing , 20 turbines                         | Jun – Sep 1998 |
| Principal approval  | May 1999       |
| Third public hearing (Environment Impact Assessment report) | Jul – Oct 1999 |
| Final permit from Danish Energy Agency                      | December 1999  |
| Contracts signed  | December 1999  |
| Construction initiated                                      | March 2000     |
| Turbines start power production                             | March 2001     |

Table 1 Process before establishment of Middelgrunden offshore wind farm [6], [7], [8]

The original project dating back to 1997 consisted of 27 turbines placed in three rows. After the public hearing in 1997, where this layout was criticised, the farm layout was changed to a slightly curved line and the number of turbines had to be decreased to 20 [10], [11].

The authorities raised a number of questions that were answered during the publicly funded pre-investigations. During the hearing in 1997 24 positive and 8 critical answers were received.

Behind these figures, a comprehensive information work is hidden, both in relation to relevant authorities and

NGO's and in relation to the many future shareholders in the co-operative.

For instance, locals were worried about potential noise impact from the farm, but after a demonstration tour to a modern on-shore wind turbine, the locals were convinced that there would be no noise impact from the Middelgrunden turbines.

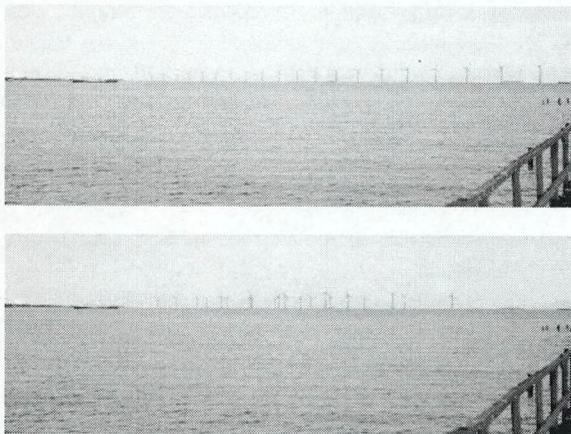
Information to the potential shareholders was in the beginning primarily carried out with the purpose of securing a sufficient number of pre-subscriptions. This turned out to be a success, and the interest of more than 10,000 local people was a proof of a strong local support, which could be useful in the approval phase.

A part of the shareholders got involved in the democratic hearing process, which was intended to create the foundation for authorities' approvals.

As an example the Danish Society for the Conservation of Nature at first decided to reject the proposed location, but through involvement of and information directed at the local committees of the society, this decision was later changed.

At the final hearing a large number of local groups and committees, not mentioning the several thousand shareholders, recommended and supported the project – only a relatively small group of yachtsmen, fishermen, individuals and politicians remained in opposition.

During and after the construction there has been surprisingly little resistance to the project, considering the visual impact from the large turbines, located just 3 km away from for instance a very popular recreational area – a beach - near Copenhagen. The reason for this lack of protest is believed to be the strong public involvement, both financially and in the planning phase.



*Figure 2 The Middelgrunden "the three rows" and "the curved line" from the beach at Kastrup [11]*

### 2.3 Lessons learned

During the approval process, authorities raised a number of questions, that were answered through the carefully planned pre-investigations.

Through dialogues with many kinds of interest groups, CEEO and the Middelgrunden Windturbine co-operation, with its 8,500 members, generated a wide-spread understanding for and social acceptance of the chosen location and layout of the farm.

Locally based commitment and co-operation between the co-operative, the local utilities CE, and the municipality of Copenhagen has been a significant precondition for the development of the project.

This co-operation has provided credibility to the project in relation to politicians, press, public etc. The municipality's role in the project has mostly been political, through the local parliament commitment to the project as such, and through the preparation of the terms of collaboration between the utilities CE and the co-operative.

### 2.4 Future offshore wind projects in Denmark

Currently two private projects are planned, along with the five 150 MW demonstration projects [9].

Of the two private projects, the one at Grenaa is owned by a private developer and has been delayed due to much local resistance.

The other private project, the 25-30 MW project at Samsø (10 turbines), is owned by shareholders, consisting of local people and neighbouring municipalities. The project work is expected to begin next spring, 2002, and because of the direct public involvement in the preplanning phase and the financial participation, the project has to date not been the focus of any major protests.

The coming five 150 MW offshore demonstration farms were intended to be utility owned, but as the utilities have seen the advantages of public involvement, they have agreed upon a plan drawn up by the Danish Association of Turbine Owners, including public financial participation. This agreement however has not been politically approved yet.

## 3 EXPERIENCE FROM SWEDEN

### 3.1 Introduction

In Sweden the first offshore turbine was erected in 1989 in Nordersund. It was owned by the local utility, and since this most offshore farms have either been owned by utility or by a private developer.

### 3.2 Karlskrona Vindkraft Offshore

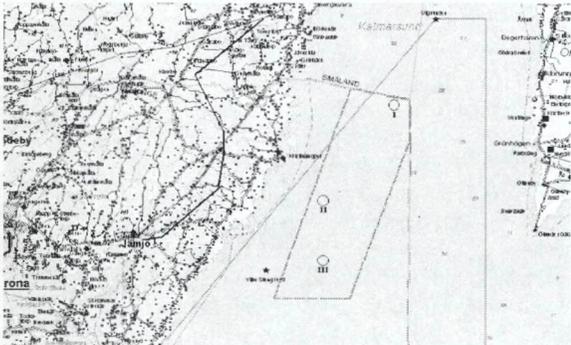
A broad-based participation in the implementation and decision process is used in a Swedish offshore project in Kalmarsund conducted by Vattenfall, the largest utility in Sweden. This is a form of conflict management which extends the group of actors involved in the decision process, increases transparency and promotes negotiations and discussions.

Special focus for this project is to investigate which parties should be involved in the decision process and how these different parties can participate and represent their interest in the planning process.

The result of this approach is so far that the project has conducted a management of dissent instead of putting trust in a fictitious consent. The importance of this type of conflict management seems to correlate with the amount of realised and planned projects in a demarcated and clearly defined geographical area suitable for offshore wind power.

Through this experience it can be concluded that the strategy suggesting that the local public opposition can be overcome by rational decisions made by experts, and that people will eventually get use to change, may prove fatal. The strategy of the Karlskrona Offshore project has instead been to directly involve the local public early in the planning phase, and incorporate the recommendations into the project planning and decision making. The purpose of this strategy is to give the local population a motivation to accept changes by for example giving them

a say in the planning of the project. Another lesson learned is that the presentation of a wind power plan requires a sense of timing. In some cases, depending on the size of the project, it might be worthwhile to allow a certain period of adjustment. A large wind farm can be developed sequentially which makes adjustments easier if people express misgivings. Such adjustments manifest the flexibility and reversible quality of wind power developments. Just because a wind farm can be erected



quickly, does not mean it should be.

Figure 3 Three different sites at Karlskrona Offshore [13]

### 3.3 Public dialogue - Use of ICT

In the Karlskrona offshore project different ways of promoting a dynamic dialogue has been developed. In this context ICT plays an important part. The use of a website for communication on project updates has been the main tool. An important task has been to make sure that this site is updated regularly and holds a high standard in order to promote confidence in the developer. Regular information has also been sent out to complement and draw attention to the website. Phone calls and e-mails have also been important tools for a direct personal response to concerned people. It has been high priority in the project to answer all questions as expediently as possible. It has also been of high priority to direct questions directly to the project management. This communication strategy has emanated in a thorough report on information, communication and reactions from the public in the EIS. On top of this the Karlskrona Offshore project has distributed two inquiries along the coast in order to identify which geographical area the public is concerned about, and *what* they are concerned about. The replies to these enquiries have been very use full for guidance concerning what topics are of central importance to emphasize in the EIA and how to mitigate in order to arrive at an acceptable EIS. Also, these enquiries have made it possible to prepare and address the issues of central importance to the public at public meetings. This has been a very effective way to create confidence in the project and the developer, Vattenfall.

## 4 CONCLUSIONS

An open public dialogue already from the very beginning of a planning phase is crucial for achieving social acceptance – and the social acceptance on the other hand may influence political decisions.

Direct public involvement, e.g. the cooperative ownership model, is an important mean for social and political acceptance, but may influence strongly on decisions taken during the planning phase, which must be accounted for in the pre-planning phase as even minor

deviations in the work at sea have a disproportional large effect on the time schedule.

There is to day no clear overview on the results of different strategies for public involvement and conflict management. This is a subject that deserves to be studied in more detail, through a monitoring programme focussing on public acceptance before and after the installation of an offshore wind farm in relation to the degree of public involvement and active conflict management. The Karlskrona Offshore project in Sweden has contributed to the layout of such a study.

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The North Sea Commission Environment Group Conference 2002 "Wind energy: how and where?", was hosted by Euregio Scheldemond.

The Euregio Scheldemond is a cross-border cooperation between the Provinces of East- and West-Flanders in Belgium and Province of Zeeland in the Netherlands.

The North Sea Commission is the organisation of regional authorities with more than 60 members in all North Sea countries.

