P·O·W·E·R

Pushing Offshore Wind
Energy Regions

Informing the general public about offshore wind energy

 - A road map on how to realise an offshore wind energy information centre including info material and multimedia tools -

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Preface

The POWER (Pushing Offshore Wind Energy Regions) project is a three year European project cofinanced by the European Regional Development Fund through the Interreg IIIB North Sea Programme. POWER creates a North Sea competence network for offshore wind energy. The project assesses environmental and planning as well as acceptance issues of offshore wind farms, supports the development of a reliable regional supply chain for the sector, and elaborates skills development measures. It runs from July 2004 to July 2007.

The aims of the POWER project are:

- to unify offshore wind competence regions around the North Sea;
- to exchange experience and to learn from each other;
- to set up common strategies and real business to business contacts overcoming economic changes;
- to respond to new educational needs on the university and further education levels;
- to disseminate the obtained results to others.

This part of the study was commissioned Port of Ostend on behalf of the following partners of POWER's Planning and Participation workstream. The partners that contributed to this report are:

- The Senator for Construction, Environment and Transport, State of Bremen (SBUV, Germany);
- The Port of Ostend (POO, Belgium);
- Institute for Chemistry and Biology of the Marine Environment (ICBM, Germany);
- Suffolk County Council (SCC, United Kingdom);
- REM Consult (Germany);
- 3E engineering (Belgium).

This document is entended for all interested member states, local authorities, and project developers aiming at informing the general public.

An electronic copy and more information on the power project and the different work packages is available for download at the POWER website: www.offshore-power.net

Contents

1. Introduction

It has been observed over the years that there is a lack of knowledge in the field of offshore wind energy. This has led to misunderstanding and delay of a number of projects. The information gap is seen in different fields:

- The feasibility of offshore wind energy
- The reliability of offshore wind energy
- The possible contribution of offshore wind energy to the energy supply
- The economic effects of offshore wind
- The environmental impact of offshore wind

Offshore wind energy is long term option for sustainable energy supply especially in Europe. The future of offshore wind can only be guaranteed if a proper communication strategy is developed. At the time of writing 700 MW of offshore wind energy is already in operation, the experience of these projects should be used to a maximum to develop a clear communication and information strategy. The communication can be done in several ways depending on the possibilities of the stakeholders.

- The realisation of an information centre
- The development of interactive multimedia tools
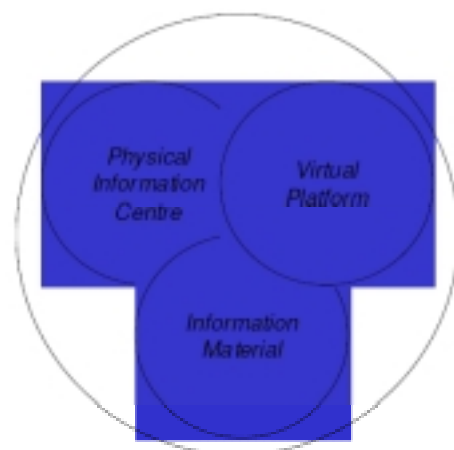- The development of appropriate information material

Figure 1: The three main components of the package

The conceptual design of an offshore information centre and the baseline to be followed in the development is the objective of this document. The three different components as presented in figure 1 don't stand isolated but will be combined in

a way that the most reachable synergy effects between them could be created. Nevertheless only parts and elements of the concept might be realised.

The document is compiled from three documents worked out by three partners within the work stream "planning and participation" of the POWER project and discussed during several meetings:

- <u>Chapter 1: The Information centre (Port of Ostend): General concept and guidelines</u>. This chapter describes the key-items to be looked after when working out an information centre. It integrates the experiences of existing information centres as well as know-how of developers of offshore wind energy.

- <u>Chapter 2: Information Material (SBUV)</u>: This chapter provides information about the type of information material which can be used in an offshore information centre to reach the target groups.

- <u>Chapter 3: Multimedia tools (ICBM)</u>: This part of the document gives an inventory of best practice examples and a proposal for the development of Multimedia Tools concerning offshore wind energy themes.

2. The Information Centre: General concept and guidelines

2.1 Introduction

Wind energy plays an important role in the context of climate protection and the need for a comprehensive change in energy production. In several countries around the North Sea Region (NSR) wind turbines already account for a considerable proportion of electricity supplies. However the development of offshore wind energy is becoming more and more important for two reasons:

- Siting of onshore wind energy projects becomes more and more difficult in the area's around the North Sea regions with densely populated areas and with the many existing land interests.
- The concern of major players about security of energy supply where offshore wind can play a major role. It has been seen that large utilities and actors from the traditional power sector are particular interested in offshore wind.

The favourable offshore wind regime combined with new wind energy technologies offers new opportunities. The NSR is paving the way for upcoming large-scale offshore wind farms in Europe.

The coastal regions around the North Sea are already confronted with these challenges, some of them are responding with comprehensive future oriented-strategies, combining innovative small and medium sized enterprises with scientific facilities and open-minded pubic administrations, forming together alliances to push their respective regions towards competence regions.

Additionally, offshore wind provides a unique opportunity to regenerate the economies of coastal regions that sometimes suffer from high unemployment and economic decline, due to their often relatively peripheral location, the collapse of fish stocks and the decline of the traditional offshore industries in Europe.

Offshore wind energy will contribute significantly to meet the European directives on renewable energy and the Kyoto protocol objectives.

In spite of the increasing importance of the Offshore Wind Energy (OWE) sector in several countries of the NSR, local resistance often blocks the realisation of important investments in offshore wind farms. This local fear for the "unknown" is in most cases due to a limited knowledge about the effects of an offshore wind farm.

Providing comprehensive information in an offshore information centre to inform and empower the general public about OWE is making thereby a substantial contribution to improve public acceptance in the concerned location areas of OWE farms.

This chapter has the aim to set out a "General concept and Guidelines" for an OWE information centre. These guidelines will be exemplary implemented in two science centres as an integrated exhibition (Bremerhaven in Germany, Ostend in Belgium).

This document has been based partially on the document "Offshore wind Energy Information Tools Survey" edited by REM · Consult, Kiel and Hamburg, Markus Lang & Andreas Huber & Annett Stoppel – funded by the German Federal Ministry of Transport, Construction and Housing, Berlin, 2004.

Furthermore, the experiences of several other member states with OWE information centres have been integrated in this document and discussed during several meetings.

2.2   Methodology

In March 2005, REM consult worked out a report called "Offshore Wind Energy Information Tools", based on the visit of seven different information centres. This resulted into lessons learned from good practice examples, and some basic rules for the set up and running of an information centre:

- Need for a sound business plan taking into account: possible number of visitors, diversification of the sources of income, different operational costs etc.,
- Legal status and overall responsible institution,
- Start small and grow with increasing resources,
- Emphasis on education (adults, kids and youth) necessary for huge number of visitors,
- Reach different target groups (tourists, kids, pupils, students),
- Different attractions: cliff way, kid specials,
- To have a highlight attraction, e.g. "the only public open wind turbine with a viewing platform",
- Information alone seems not enough and might be too boring, interaction is needed,
- A good location within the dunes and nearby the beach with a direct view to the OWF or try to integrate in existing services,
- Fortify the bottom-up approach to enable sustainable surviving of the initiative,
- To combine boat tours with other tourist attractions (e.g. seal banks),
- Resistance, quality and freshness of exhibition materials is important.

Based on the review of operational information centres, nine rules for the set up and running of an Information Centre have been derived.

1. Secure funding
2. Non commercial nature of information
3. To select trained staff (periodic training, support by external consultants)
4. Networking
5. Partnership and other partners
6. To set targets and evaluate actions
7. To supply quality support of information
8. To identify a coherent area
9. To ensure a permanent service

2.3. Objectives

The objectives of an OWE information centre are (or should be) the following::

- Inform a broad public on the pro's and contra's of an offshore wind farm,
- Demonstrate the positive effects on the local economical activities, local employment, and tourism…,
- Create an educational platform which can be used by schools to learn about renewable energy,
- Increase the public acceptance of an offshore wind farm in front of "their" coast,
- Reinforce the alliance in between project developers and the local communities,
- Demonstrate the role of offshore wind energy in the European energy strategy.

Some examples of information that has to be „shared":

- Information on climate changes and global warming, Kyoto Protocol, EU strategies and directives
- energy generation background, oil and gas reserves, worldwide, in Europe, in the NSR
- onshore / nearshore / offshore (main focus) wind energy: history, current situation, trends and perspectives in general
- dimensions of OWE development worldwide, in Europe, in the NSR, installed and planned capacities and productions
- Practical information on the different technologies of OWE: foundations, wind turbine set-up and functioning, grid-connection etc.
- the positive economic effects of OWE
- to sensitize towards the whole range of OWE impacts – environment, climate, energy, production, job effects, social welfare
- to educate especially young people (multiplicator effects)

2.4. Target groups

The first step in the creation of an information center or in the development of material is the selection of the target groups. A mix of different target groups is the key to success: some target groups will only visit the information centre on weekdays and not during holiday periods (p.e. schools), other target groups will mainly visit it during weekends and holiday periods (p.e. tourists) and some groups will focus on guided evening visits (like local interest groups).

The selection of the target groups will also define the kind of information and material which will be provided adjusted to age, education level, interests… and the way this information will be provided.

In case the OWE information centre will be situated nearby a tourist centre, specialised information on number of tourists, kind of tourists, nationalities, number of nights, school visits… will be available to be used to estimate the possible number of visitors to the OWE information centre.

Two major groups of possible visitors can be defined:

- Local inhabitants
    - Students
    - Local organisations
    - Interested inhabitants
- Tourists
    - Accidental tourists: mainly in case of a strategic location
    - Organised tourists visits
    - Tourists driven by an interest in renewable energy
    - Specific target groups: line fishers, sailors
    - Tourists attracted by special events: kite festivals, beach games

Before a location and a building is selected, an inventory of the target groups, including a quantitative analysis has to be carried out to fit the means to the targets (and available budget of course).

2.5.   Locations

Several aspects have to be taken into account for the selection of a suitable site for an OWE information centre:

- Relation to the offshore wind farm: Preferably, an OWE information centre has to be located as close as possible to the coastline to allow to observe the visual impact of an offshore wind farm. In case the offshore wind farm is situated at more than 10 km offshore, binoculars at the roof of the information centre could be advisable.
- Accessibility: As all tourist infrastructure, the success of an OWE information centre will largely depend upon its location. Equilibrium has to be found in between an excellent location nearby tourist centres and its relation to offshore wind (view on the wind farm).
- Relation to the daily operation of a wind farm: If possible, additional attraction can be obtained by combining the daily operation of the wind farm with the

information centre. This will not only add value to the information centre by showing how an offshore wind farm is operated but will also have multiple positive effects on the daily management of an OWE information centre.

- <u>Fit to the target groups</u>: The location of the OWE information centre has to be in line with the results of the target group and quantitative analysis.

2.6 Type of building

The first choice to be made is the choice in between a new building and an existing building. From a "sustainability viewpoint" the refurbishment of an existing building fits more the purpose than the construction of a new building. In case a neglected or unoccupied building can be reused, also the local acceptability can be increased. Therefore, a detailed screening of the local real estate market is the first thing to be carried out to find the most optimal location and type of building.

The integration of an OWE information centre into an existing science or tourist centre is an interesting option for creating synergies and reducing costs.

The introduction of a zero emission concept and maximum use of renewable (offshore wind) energy should be explicitly present and visible. This has to be translated into the architectural design of the OWE information building. Solar panels, small scale wind turbines, energy saving measures… should be included to underline the renewable philosophy of the project and to increase the credibility of the development.

To give greater publicity to this building, an architectural design contest can be organised to select the most appropriate design. Appropriate signing towards the building sound logic but is often neglected.

2.7 Business plan – Success factors

It has been observed that the long term sustainability of an offshore centre is depending on a good prepared business plan. Following success factors have been identified to guarantee the sustainability of an OWE information centre:

- Strategic location,
- Focussed publicity,
- Start small and grow with increasing resources,
- Emphasis on education to attract sufficient visitors. Ensure follow-up activities by providing digital support (virtual platform) and / or high quality information material,
- Diversify to reach different target groups,

- Have a highlight tourist attraction e.g. "the only public open wind turbine with a viewing platform",
- Combine the OWE information centre with other attractions (boat trip to the wind farm, sailing cup, line fishing events…). Partnerships can increase significantly the attractiveness of the information centre,
- Organise special activities & events (e.g. kite festival, day off the earth…),
- Limit operational costs by combining the visitor centre with existing and / or complementary activities (e.g. operation of the wind farm or existing exhibitions…),
- Ensure long term sponsoring (e.g. by the operator of the wind farm and / or the local authorities),
- Engage a professional staff and motivated temporarily staff during high season.

2.8   Publicity

Publicity is of crucial importance to guarantee the sustainable surviving of an OWE tourist information centre. Planning an OWE information centre requires the screening and inventory of the publicity possibilities. The following publicity mediums should be evaluated on their possible added value:

- Local tourism office (see also combination with other attractions / tourism),
- Brochures, leaflets, flyers: to be distributed in local hotels, railway stations, tourism office… or during special events,
- Direct mailing: focussed publicity towards defined target groups: schools, local associations…
- OWE information centre website: links from other related websites towards this website are of crucial importance to direct possible interested visitors towards this OWE information centre website,
- Local press and or local TV: the involvement of the local press and local TV at special occasions (like a ground breaking ceremony, special events…) can have a positive (however temporarily) effect,
- Electronic newsletters: sending a newsletter on special occasions can have a major influence assuming an updated and targeted mailing list.

A yearly budget for publicity should be included in the business plan to ensure sustainable efforts on attracting a substantial number of yearly visitors.

2.9   Running costs – staff

Apart from the funds required to start up an OWE information centre, financial means are required to cover the operational expenses.

Comparing the investment budget of an offshore wind farm (rule of thumb: 2.000 € / kW installed: 100 MW $\rightarrow$ 200 million €) versus the investment required for an OWE information centre, it is obvious that an information centre has no major impact on the total project cost. Public private partnerships where the day-one investment and the operating costs for an OWE information centre are spread in between the owner of the wind farm and the (local) authorities are advisable. This can be "imposed" by special clauses in the authorisations where the dissimilation of information and / or the information of the broad public are one of the conditions in the permit.

Once the investment has been made, the sustainability of the OWE information centre has to be guaranteed by means of providing sufficient financial means to cover the operational expenses. The operating expenses will largely depend upon following items:

- Number of own staff required
- Rent cost of the building
- Opening period and hours
- Maintenance costs of the building (housing costs)
- Organisation of special events / attractions / activities
- Publicity efforts (website, advertising, mailings…)
- Number and kind of visitors
- Distribution of information material (updating brochures…)

In case no rent costs are due, the staff costs will be the major operating cost. Synergetic effects can strongly reduce this cost (e.g. by combined management with other attractions, tourism offices, operation of the wind farm…).

The operating revenues will largely depend upon:
- The sponsoring by the owner of the wind: e.g. by providing staff in case of the visitor centre will be combined with the operation building
- Subsidies by (local) authorities
- Entrance fees: to evaluated if required
- Revenues out of special events, attractions / activities…

Sustainability can only be guaranteed if the operating revenues are exceeding the operating charges.

Lessons learned from other similar projects are demonstrating that revenues are often systematically overestimated and expenses often underrated. A long-term realistic business plan including a second opinion carried out by an objective third party is the key to success!!!

In general revenues will decrease in function of time if no measures are taken to increase the attractiveness with specific actions. A visitors centre may NOT be a static exposition but needs an interactive approach.

2.10 Timing

The moment an OWE information centre has to be opened will largely depend upon who is sponsoring the information centre and which budgets are available.

Most optimal is to start up the OWE information centre during the authorisation process and to use this centre to inform the broad public about offshore wind. This will largely increase the public acceptance of an offshore wind farm.

However, in most cases, this will not be the case. Alternatively, the OWE information centre could be build as soon as it is certain that the wind farm will be build. This allows to provide information about both the construction and the operation of the wind farm.

2.11 Combination with other attractions / tourism

One off the most critical success factors is the combination of the OWE information centre with other activities, attractions and special events.

An OWE information centre risks to be to boring if it only stands on its own. Also the time required to visit such an information centre is not sufficient to be a stand-alone activity. A balanced mix of activities will guarantee a better frequenting of the centre.

This problem can be solved by working out partnerships with other "similar" organisations / activities which can complete the visit.

Depending upon the target group a wide range off activities can be worked out and organised, often in cooperation with other organisations and / or private partners:

- boat trips to the wind farm
- fishing trips in the wind farm
- visit to off-shore seal banks
- renewable energy workshops
- assembly activities with scale model turbines
- beach games
- sail events
- combination with other exhibition rooms, museums,…

Cooperation with the local tourism information centres is advisable to be able to offer (half) day programmes.

3. Exhibits and information material

3.1 Introduction

Information material and exhibits have to be developed. The information material can be used in the information centre but can also be used independently, for example interactive websites.

The objective of the information material and exhibits is to provide answers on frequent asked questions on offshore wind energy and climate change and to give insight in the ways offshore wind farms are planned, realised and maintained.

Clear answers should be provided on questions raised by the target groups like the role of wind in the energy supply, the reliability of energy supplied, new techniques for management, predictions etc.

3.2 Recommendations for the selection of media and content

The following guidelines based on the report "Offshore Wind Energy Information Tools", by Markus Lang, REM · Consult:

- use different media for different contents and target groups,
- offer different depth of information, i.e. a main room with general information and special quarters with detailed information,
- tell a story which combines the different elements of the information material. combine information, education and entertainment,
- the exhibition should not be an industrial fair or a collection of single elements but a holistic approach to offer the chances of wind energy for the people. Thus it should generate acceptance and awareness for this renewable energy source,
- think about different target groups like local inhabitants, tourists, event-visitors and do not focus only of wind energy experts,
- realise synergy effects with real- life entertainment if offshore farms are nearby (boat trips, helicopter flights etc.),
- At least there should be one unique selling tool, which is not available at any other place in the world. This makes publicity work and promotion much easier,
- in general all information centres open to the public should be designed twofold:

o An emotional entrance to the topic (feel, touch, smell, see, listen for all ages)

o An information spots with interactive media (separated for different ages).

3.3 Examples for usage of media and presentation of content

Information material to be included in a centre should not be a boring collection of posters on panels nor static scale models. It should be as surprising as possible and use to a maximum dynamic features, some examples are listed below:

- The entrance of the information centre could introduce the visitor to the thematic framework of the exhibition; e.g. a wind tunnel where they can FEEL the wind and the power of it.
- A water reservoir in plexi showing the monopile and the movement exaggerated due to waves.
- Webcams and on line information about the actual energy production and other relevant data from a windfarm nearby offer a real impression in addition to the virtual information but presented in a comprehensive way for example a map with houses showing how much houses are powered with the windfarm.
- A picture board could inform about the role of wind in the evolution of mankind together with fairy tails about wind, poems, music etc.
- An important element could be a bigger touch screen with the North-Sea-Region and the locations of wind farms (planned and realised) behind the pins of the wind farms the visitors get online information from the planning process, meteorological data, wind speeds, online webcam pictures etc. (See chapter 4).
- Furthermore information on energy supply, planned grid connections etc. could be integrated. The same idea could also be realised through a relief model of the North-Sea with visual and audio information (See chapter 4).
- Computers can be used for different kinds of games, but also for in depth information and online links about climate protection and offshore windenergy (See chapter 4).
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4. Multimedia Tools

Multimedia Tools (MT) are another way to give insight in the ways offshore wind farms are planned, realised and maintained. The MTs will be a mixture of new telecommunication based techniques that are flexible applicable on touch screens, mobile PC terminals and websites. Information will be presented mainly for kids, pupils, students and the general interest public.

4.1 About multimedia

Multimedia is in general the use of several different media to convey information (text, audio, graphics, animation, video, and interactivity). As the information is presented in various formats, multimedia techniques enhance user experience and make it easier and faster to grasp information. Presenting information in various formats is nothing new, but multimedia generally implies presenting information in various digital formats.[1]

Multimedia finds its application in different areas including, but not limited to, art, education, entertainment, engineering, medicine, mathematics, and scientific research. The purpose in this concept is to use multimedia mainly for information and education or better edutainment – education by entertainment.

Multimedia applications that allow users to actively participate instead of just sitting by as passive recipients of information are called Interactive Multimedia. Examples are interactive multimedia games. The environment is created by using controls like joysticks and sensors and by using media output devices like headsets and goggles. The various multimedia components are coordinated with a technique called virtual reality. They provide an environment that is experienced by users as similar to reality. This technique is used in some arcade games and also in flight simulators, to impart training to pilots, without having to go for a real flight. The interactive aspect of multimedia allows an individual user-tailored transfer of knowledge as well as experimental orientated take-up of information. These advantages are opened up by training programmes as e-learning including computer or web based training courses (popularly called CBTs or for web-based systems WBTs). A CBT or WBT lets the user go through a series of presentations, text about a particular topic, and associated illustrations in various information formats.

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[1] Source: www.wikipedia.de, May 2005

4.2 General aims

The advantage of MTs is the ability to react fast on new situations. MTs should impart new knowledge about offshore wind energy and also confirm existing knowledge. The concept incorporates three units that target the general aim in three different ways.

- One approach is to present factual knowledge were well defined questions could be derived from and definitive answers could be found. It consists of a systematic presentation of contents (textual, pictures, animation) and an exercise tool, which contains questions that will be answered by the user. This approach is defined here as information and training tools (ITT).
- The second approach is based on interactive multimedia techniques (IMT). Simulation and casual games could be used for creating an experimental environment in which users can test interactive dependencies and gain experiences in the field of offshore wind energy.
- Finally a third environment could comprise a web cam (installed for instance on an offshore turbine), pictures and movies to impart the user a picture of the "reality". We will call it the visual component (VC).

4.3 Objectives

The development of the Multimedia Tools strongly accompanies the design of the Information Material and the Information Centre. Thus the objectives will be regarded as the same as the information centre. However the target groups could be more specified , e.g. not the accidental tourist on a rainy day.

4.4 Realisation

The three components of the Multimedia Tools could be installed online as well as on kiosk systems/ touch screens in the information centre and as mobile unit on portable PC terminals – that can be easily erected at interesting and/or highly frequented spots and linked to other already existing platforms. The contents should be as general as possible to be used in all POWER regions. Certainly all project partners will be able to contribute in some extent to the contents of the system and will furthermore deliver additional regional information.

4.5   Best practice examples

In this chapter already existing tools are investigated and analysed in order to use and/ or share already existing information and to learn from other projects. Considering the classification in the three units nine different information tools have been selected as good practice examples.

In the following all essential factors and transfer topics that could be of relevance for the overall concept of the Multimedia Tools were listed and taken into account while elaborating the concept.

Information and Training tools

	www.windinformation.de	www.windpower.org	www.gepower.com
Target groups	interested non-specialists, pupils and students sometimes young professionals	for people who want to know a lot about wind energy, short of becoming wind engineers	kids and teachers
Aim	present factual information about (offshore) wind energy to objectify the public discussion, which is often based on misinformation and prejudices. The web site should prove all interested persons an insight in the principles of wind energy	answering the most common questions about wind energy	learning about wind energy
Advantages	professional and attractive design good structure short and plain information nice pictures, both photos and 3D animations one highlight is an interactive tool for building a wind energy plant objective information is presented well-balanced mix of textual information and pictures	web site is also available on CD-ROM test skills by answering a quiz on wind energy lot of pictures, figures, photos and animations objective information is presented well-balanced mix of textual information, pictures and interactive units different languages integrated in a platform that also addresses kids	highlight the presentation from a fun poster contest motivate for discussing wind energy issues lot of worksheets for teachers and students addresses especially little kids by activities like painting.
Disadvantages	no tools for kids integrated, information only for elder pupils easy to get Only in German	the design is very complex only an experienced target group is addressed the site was last updated in 2003 > bad maintenance	

Table 1: Some examples of interactive training tools

Interactive Multimedia Tools

Tool	Wind with Miller – Danish Wind Industry Association	Offshore Wind Game – Greenpeace	Ventum – TU Delft & Erasmus University of Rotterdam	Energy Fuelling the Future – London Science Museum
Target group	kids (teaching class 5 and up), CEOs and everyone in between Teachers	kids and everyone who like games	professionals and students who are engaged in the management of complex technological projects	children age 7-14, their teachers and families
Objective	to give kids an intuitive grasp at advanced wind power by a fast and fun way	to promote renewable energies	Ventum on line is a learning and experiential environment for professionals and students who are engaged in the management of complex technologies, it offers an environment to test and develop one's skills in project management focusing on offshore wind energy	educate children; they can explore how energy powers every aspect of their lives
Advantages	available in different languages, includes teachers guidelines, a character guides through the platform, highly interactive and intuitive	attractive design the game principle is used to get people interested in offshore wind energy advantages and disadvantages are integrated in form of solar pads and oil barrels it is easy to learn	professional and attractive designed game participants can draw conclusions for themselves and for real project management different versions from one hour to several weeks or month are available it does not require any specific knowledge about wind turbines or parks	professional and attractive design teachers zone, lot of activities for classrooms are presented various stories combined with pictures that inform about energy animations in which a speaker explains the respective themes lot of short interactive games complexity of supply is taught

			many information are presented complexity of offshore wind farm planning is taught in a playful way interaction with other users simulation can be embedded in a course or training program in parallel to other didactical methods and events	in a playful way interaction with other users energy gallery, showing online which tools are available in the science centre
disadvantages	environmental issues are left out partly the structure is not plain	only few functions > it may become boring after a while only available in english no additional information is presented	needs time to be learned not online available yet	none could found

Table 2: Some examples of interactive multimedia tools

Source: www.greenpeace.org.uk/Templates/template3_view.cfm?UCIDParam=20030212104755

Source: www.ventum.nl

Source: www.sciencemuseum.org.uk/exhibitions/energy/

Source: www.windpower.org

Visual Components

Tool	Alternative Energy Institute	Elsam essential energy
target	all people that are interested in wind energy	all interested people
objective	Non specific	follow the Horns Rev project via web-cam
Advantages	Get an impression of reality Commented pictures	Gives an impression on reality
Disadvantages	not very professional structure as well as pictures	none

Table 3: Some examples of visual components

Source: www.windenergy.org

Source: www.hornsrev.dk

Some websites are listed that present information and/ or training tools; not necessarily only for wind energy.

- EmbraceWind: website that includes a photo exhibition respective an interactive gallery, www.embracewind.com
- Zilkha: website that includes an art gallery with pictures made by kids, www.zilkha.com
- Teacher's Domain: website with wind mill gallery, www.teachersdomain.org
- Energy Fuelling the Future: animations with a speaker guiding through it, see above, www.sciencemuseum.org.uk/exhibitions/energy/
- Tauern Wind: panorama views and photo gallery including building a wind farm, transport, erection and components, webcam, www.tauernwind.com

4.6 Conceptual design

As described above Multimedia Tools can be classified in three units: Information and Training Tools (ITT), Interactive Multimedia (IMT) and Visual Components (VC). These units ought to present information in a condensed and easy to understanding way to be used in equal manner on touch screens or kiosk systems in a science center or on transportable PC's as well as web-based. This approach can facilitate actualisation and maintenance and can reduce time and effort during the design.

Three main target groups have been defined: adults, pupils and kids. Accordingly, the nature of the presented information and the design of the tools could vary from group to group. One possible approach in case of a website is a division already on the start screen:
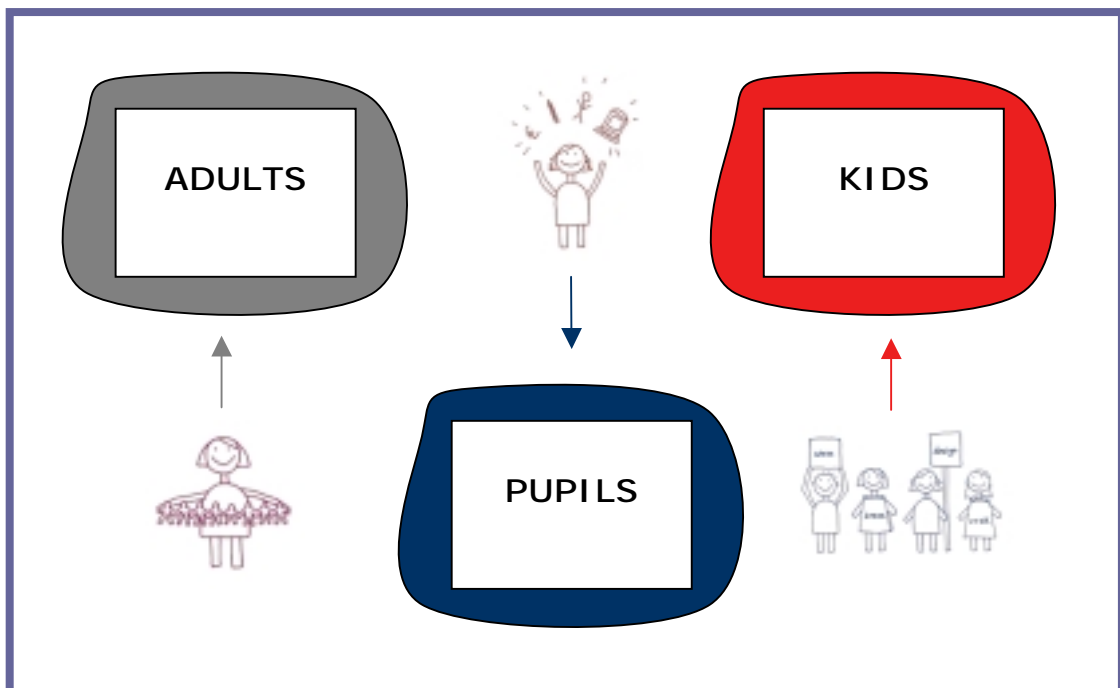

Figure 2: Possible approach fro a start screen

People can easily choose what their section of interest is. In a science centre or on portable PC systems the sections could be installed on separate screens. The sections can be clearly separated for instance by using different colors. Similar zoning within the science centre or on information material could be helpful for harmonising and simplification of utilisation.

Every section can be again parted in the three units. An example for kids could be:
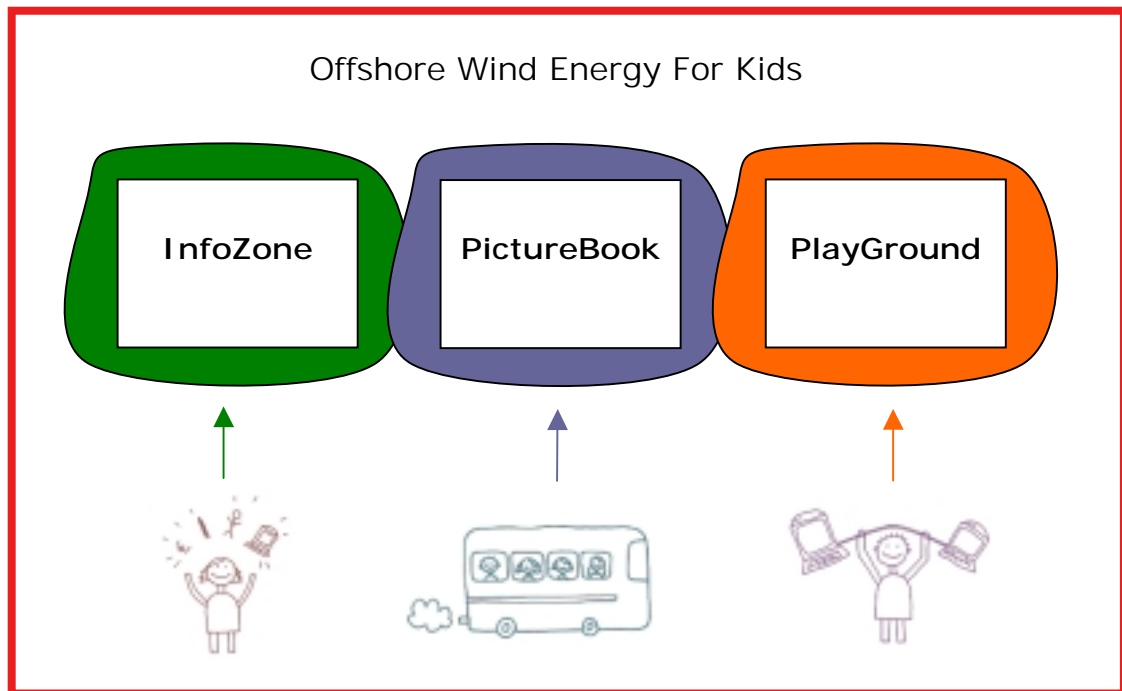
Figure 3: Splitting up

Each topic may include several games pictures and textual information. A first attempt which tools could be included is made in the next chapter.

4.7   Tool box

Below a list of tools is presented that could be subject of the multimedia approach. It is based on the one hand on the knowledge gained by the best practice examples and on the other hand on simple brainstorming by the authors. Neither is this a complete list nor all the proposals must be realised. Depending on funding, expenditure of time and value for education it could be decided which tools could actually be accomplished. The modular concept allows a step-by-step realisation so that basic tools can be realised in short time and can be supplemented in long term.

The tools are assigned to the three topics ITT, IMT and VS as well as to the target group:

Tool	Adults	Pupils	Kids
Information and Training Tool (ITT)			
Information Box	Interactive maps, text, pictures		
Information Box Guided Tour		A figure guides through the information, e.g. environmental minister, wind miller	A figure guides through the information, e.g. environmental minister, wind miller
Interesting Tidings	X	X	X
Quiz	X	X	X
Work Sheets		Build a mill	Build a Mill
Teachers Material	Suggestions for discussing OWE in the class room		
FAQ	X	X	X
Interactive Multimedia Techniques (IMT)			
Casual Games			Memory, Puzzle
Interactive Games	3D Flight, Visibility Simulation, Build a mill consider marine environmental conditions	Build a mill consider marine environmental conditions	Build a Mill, Find an optimal Site (with online comments of virtual stakeholder), Be a bird/ boat and fly/ sail between the mills
Competition Games	X	X	The speediest wind miller (Build a wind tubine, play against a visitor in another center or museum)
"Body-controlled" games	X	X	Games which can be controlled by moving feet or drums, or also visually by cameras (eye toy)

Painting		Send your picture to us, resp. paint a wind mill (in case of installation in the science centre)	Send your picture to us, resp. paint a wind mill (in case of installation in the science centre)
Chats	X	Say your opinion and see what other visitors think about OWE	
Visual Component (VC)			
Webcam	X	X	X
Real videos	Transport, installation, operation, maintenance	Transport, installation, operation, maintenance	Hear the power of the wind
Animated Videos			Story of an OWF (explained by a speaker)
Display Energy Production	X	X	
Photo Gallery	General pictures, Panorama view	General pictures, Panorama view	General pictures, Panorama view
Installation Diaries	X	X	X
Art Gallery		Paint pictures on screen (see above), Show pictures painted by other pupils	Paint pictures on screen (see above), Show pictures painted by other kids
…			

Table 4: Toolbox

4.8   Media

There are different kinds of media like touch screens, kiosk systems and portable PC solutions available on the market. Here only a short overview is given of what might be possible to use.

There is a wide selection of highly specified Kiosk Systems on the marked - systems that are including features like custom casings, keyboards, weatherproof outdoor models, built in printers and sensors. The systems are available free standing, wall mounted or as desk space. (Price range 1.000 € to 10.000 €)

Figure 4: Some examples of kiosk systems

In addition a variety of touch screen monitors, touch panels (screens that can be used in front of a usual computer screen) or touch computer (an integration of a touch monitor with a computer in the space of an LCD) are offered. (Price range 1000 € to 15.000 €)

Figure 5: Some more examples

A third method is using interactive whiteboards (for instance "Smartboard"). Simply by touching a large display, users can access and control any computer application or multimedia platform, including the Internet, CD-ROMs and DVDs. The touch-sensitive display connects to a computer and digital projector to show the computer image. With special software, users can write over applications in digital ink and then edit, save, print or post their notes to a website for future reference. (Price range 2000 € to >30.000 €)

Figure 6: Smart board systems

In parallel a web-based version can be installed.

4.9   Further remarks

In the following lessons that can be taken from the good practice examples and other notes that could be helpful for the realisation of the Multimedia Tools are listed:

- Try to create as much as possible synergies with the Information Material and the Information Centre to heighten effectiveness of work (for instance: use same FAQ, same textual information as for information material)
- Do not present too much information both for touch screens and web-based versions. The structure must be intuitive and manageable at once. Nevertheless the information must be interesting else people would become too soon "bored". Interesting tidings is an adequate tool to attract users for long term.
- A lot of animation tools and interactive features should be used and a good mix of written information, interactive features and visualising tools should be assured.
- Assure usability and user-friendliness, to reach the different target groups.
- Start small and grow with increasing resources.
- Use different identification elements like figures that guide through the platform or pictures that make the user feel concerned (in a positive way).
- Spent enough effort for professional solutions.

Conclusions

Offshore wind energy is long term option for sustainable energy supply in Europe but also becoming more important in other parts of the world (China, US). The future of offshore wind can only be guaranteed if a proper communication strategy is developed. The communication should emphasis on solutions and answers to questions of the general public.

This communication can be done in several ways and with a combination of several means depending on the possibilities of the stakeholders. A physical information centre is one solution but needs a thorough preparation in terms of financing and content to ensure sustainability. Practical experiences have shown that an interactive approach and a good mixture of information material combined with multimedia has the best results.

Information material has to be designed in a clever way in order to attract and surprise the visitors. It can not be a collection of information panels but need an interactive approach.

Multimedia will play an important role in the information package as it has the ability to react fast on new situations. A number of examples of this multimedia techniques have been shown in the document. Interactivity ensures a modern way of communication of which offshore wind will certainly benefit.

The results of this study will be implemented in information centres that are open to the public in the Port of Ostend in Belgium and in Bremerhaven in Germany. Information material and a multimedia platform will be implemented to disseminate the information about offshore wind energy in the North Sea Region.

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