Offshore wind farm development - Europe

1. Policy Objective & Theme

- SUSTAINABLE USE OF RESOURCES: Sound use of resources and promotion of less resource intensive processes/products
- SUSTAINABLE ECONOMIC GROWTH: Improving competitiveness

2. Key Approaches

- Ecosystems based approach
- Technical

3. Experiences that can be exchanged

The production of electricity from offshore wind energy and the cooperation needed by Member States to create international grids to equalise European energy production. Better integration with other sectors is still needed.

4. Overview of the case

Member states are increasing their ambitions with respect to offshore wind energy as a means of meeting their commitments to producing 20% of their energy from renewables by 2020.

5. Context and Objectives

a) Context

In accordance with Directive 2009/28/EC (23.4.2009), Member States must establish mandatory national targets consistent with a 20% share of energy from renewable sources by 2020. A Renewable Energy Road Map (2006), an integral part of the Strategic European Energy Review, sets out a long-term strategy for renewable energy sources in the EU. The Commission is also preparing an Action Plan on offshore and coastal water wind energy. Prior to 2009, 1485MW were being produced offshore by the United Kingdom (591MW), Denmark (424MW), Netherlands (247MW), Sweden (133MW), Belgium (30MW), Ireland (25MW), Finland (24MW), Germany (12MW) & Italy (0.08MW) . As of January 2009, a further 2565MW were being constructed by the UK (1392MW), DE (732MW), DK (449MW) & SE (30MW). Moreover, Italy and Portugal are testing floating turbines for use in deeper waters whilst Latvia, France, Spain, and Poland are all at different stages of planning for offshore wind turbines. In 2008, 357MW were added to the offshore capacity which is now 2.4% of the EU's wind energy capacity. Both on- and offshore wind power is, since 2008, the EU's biggest energy growth sector. Already, this increase of wind energy is contributing to climate protection, sustainable development, economic growth, job creation, technical development and will boost significantly the EU's export potential. Wind could contribute 12% of EU electricity by 2020 and one third of this is likely to come from offshore installations. This would amount to 40GW from offshore wind compared to just under 1.5GW offshore today

b) Objectives

For off-shore wind energy to make a substantial contribution to the EU target of 20% energy production to come from renewable sources by 2020.

6. Implementation of the ICZM Approach (i.e. management, tools, resources)

a) Management

Responsibility for wind farms fall under the management of the national governments, normally the Department of Energy or equivalent.

b) ICZM tools

Apart from wind farms that will be built in near-shore areas, even off-shore wind farms several (tens of) kilometers from the shore will need to be integrated into the coastal management regimes because of the cables that are needed to bring the converted wind power as electricity to the shoreline. The laying of the cables needs to take into account other coastal users such as shipping, military use and mari-culture.

International cooperation is already being pursued to get the energy to land. Instead of each country linking its wind farms to their own national grid, countries are seeking to link their energy flows. This will not only cut costs but will equalise European energy production as wind speed is variable geographically. The Netherlands is currently working on a fourth interconnector with Germany, the BritNed undersea cable link with the UK and the NorNed undersea cable link with Norway and looking into the possibility of an undersea cable link to connect with Denmark. There is an international test field at Kriegers Flak, a triangle where the exclusive economic zones of Sweden, Denmark and Germany meet. A Swedish offshore wind farm with 128 wind turbines in a stretch of the Baltic Sea at a depth of 17-40m water depth is being planned. It corresponds to the domestic electrical energy demand of around 400,000 homes. It will be completed in stages during the period between 2009 and 2013 and it is estimated that up to 1800 MW of wind power can be generated. German and Danish plants are planned in the same area and the idea is to make a three-legged interconnector for the three countries rather than each having its own connection. Collaboration has been initiated with the EC's working group for offshore/onshore grid development on wind power and grid expansion headed by the European coordinator for the connection of offshore wind farms in Northern Europe. A more ambitious network creating an inter-linked energy hub in the central North Sea to link energy flows between Norway, the Netherlands, Belgium, France, England, Wales, Scotland and Ireland is on a scale hitherto unseen. The hub could be the fulcrum not only of energy flows from offshore wind but also onshore wind, nuclear baseload, wave and tidal generation and fossil-fuelled plants held in reserve. An undersea grid in the North Sea would give energy markets access to a reserve capacity over a wider area. It could provide services to transmission system operators and makes the most of the geographic dispersion of wind. In order to cope with conditions further offshore in deep waters, wind turbines are being designed that can float. A company (Blue H, incorporated in the U.K. but operating from the Netherlands) has installed the world’s first floating wind turbine prototype in the summer of 2008 in the Strait of Otranto, Southern Italy. The company is currently building the first operational 2MW unit which it expects to deploy at the same site in 2009, the first in the planned 90 MW Tricase offshore wind farm, located more than 20 kilometers distant from the coast line.

The cost-effectiveness of offshore wind power is being met by Member states through so called feed-in-tariffs. The basic idea is to grant wind farm operators a fixed payment for 20 years to ensure an economic operation of the plants. Several countries have, further, set up user groups to improve the acceptance of, gather information on, and gain experience from wind energy, In Germany, this is the offshore wind energy foundation whose members are the manufacturers, planners, energy supply companies, banks, insurance companies, associations, engineering firms and the federal states in northern Germany. In the UK, the Renewables Advisory Board and the Sustainable Development Commission are public bodies which feed in stakeholder opinions to governmental policy, programmes and measures.

Offshore wind energy has been slow to take off in Spain because of fears of the visual impact on the tourist industry. In Germany, the complexity of planning laws for the cables bringing the energy ashore has had a similar effect.

7. Cost and resources

Financing of projects is the combined responsibility of government and private enterprise. However, because of the risk, governments need to provide financial support mechanisms to bridge the gap between cost and economic value of wind energy. This is already the case in some Member States.

8. Effectiveness (i.e. were the foreseen goals/objectives of the work reached?)

The common ground between offshore renewables and the oil and gas industry can be turned into an asset if the opportunities are seized in coastal areas to achieve a managed, gradual transition to the new energies.

9. Success and Fail factors

At present offshore wind competes, on the one hand, with onshore wind for the existing turbine production capacity and, on the other, with the oil and gas exploration industry for the existing offshore equipment and expertise. In this "double-squeeze", offshore wind is disadvantaged from working up from a niche market to a full scale industry. Investors are wary of making substantial investments in Research & Development and in the required increases in supply chain capacity as long as the technology is still climbing the learning curve and while the industry still depends on national subsidies. Although there is sharing of knowledge, there appears to be little internation cooperation to reach the renewable targets set.

10. Unforeseen outcomes

Uncertainties exist about how wind energy plants will impact wildlife and studies of marine species in the vicinity of offshore wind energy plants must be pursued. Furthermore, the influences of each possible construction type must be regarded and assessed. The same refers to shipping safety in combination with wind energy plants. Even if wind farms are not constructed in waterways with high shipping frequencies, the risk of collision still cannot be excluded. Wind turbines and cables will cause difficulties to fishing by making it impossible to trawl and net fishing may also be more difficult. In return, the area may become a protected reproduction area for fish and populations could increase in the longer term which would ultimately benefit the fishing industry. As with the development of wind energy on land, the achievement of the goals of the offshore wind energy market is only possible when having the right economic frame conditions for investors.

11. Prepared by

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12. Verified by

It has not been possible to verify this case.

13. Sources

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- Kriegers Flak Wind Farm (undated) Vattenfall
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