



▶ The coast between Cromer and Overstrand in North Norfolk

# DUDGEON

## Offshore Wind Farm

Autumn 2013



We are committed to working with the offshore wind industry to develop the supply chain. We believe that a well-developed, technology based supply chain will ultimately play a major role in reducing the cost of renewable energy.

I foresee that this will involve us working in consortia and partnerships with a number of different companies and organisations, a process to which we are already well accustomed in the oil and gas sector.



*Halfdan Brustad, Vice President,  
Statoil Renewables Offshore Wind and  
Chairman of Dudgeon Offshore Wind Limited.*

# Dudgeon project benefits from technology advances

The Dudgeon Offshore Wind Farm project has changed immeasurably since Statoil and Statkraft purchased the project through the acquisition of all the shares in Dudgeon Offshore Wind Limited in October 2012. The project is both pushing and taking advantage of technological developments in the offshore wind farm sector over the last years.

Originally planned with an installed capacity of 560MW, the Dudgeon Offshore Wind Farm is now likely to have an installed capacity of approximately 400MW from 50-80 wind turbines. This reduction in the number of turbines has been made possible by the successful development of larger capacity (5-8MW) wind turbine generators.

Advances in computer modelling have enabled the Dudgeon Team to better assess the wake effects from the turbines, establishing an optimum wind farm layout

within the consented area. The result is a more wind efficient layout designed to have less environmental and navigational impact. Detailed seabed surveys and novel foundation designs, including large monopiles and jackets, confirm the feasibility of the layout..

"The advances in technology are not just happening in engineering," said Dudgeon Offshore Wind Chairman Halfdan Brustad. "They are now starting to permeate along the product and service supply chains." ■

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# Variations requested to offshore planning consent

Following a review of the design of the offshore wind farm site which obtained planning consent in 2012 prior to the project being acquired by Statoil and Statkraft, Dudgeon Offshore Wind has now submitted an application to The Department of Energy and Climate Change (DECC) for a variation to the existing offshore planning consents.

In summary, this review highlighted concern relating to the stability of the wind turbine foundations due to areas of mobile sandwaves across the site and the chalk structure of the subsea bed; it also indicated that in order to avoid the wake effects of placing the wind turbines too closely together, the capacity of the wind farm should be reduced from 560 MW to around 400MW.

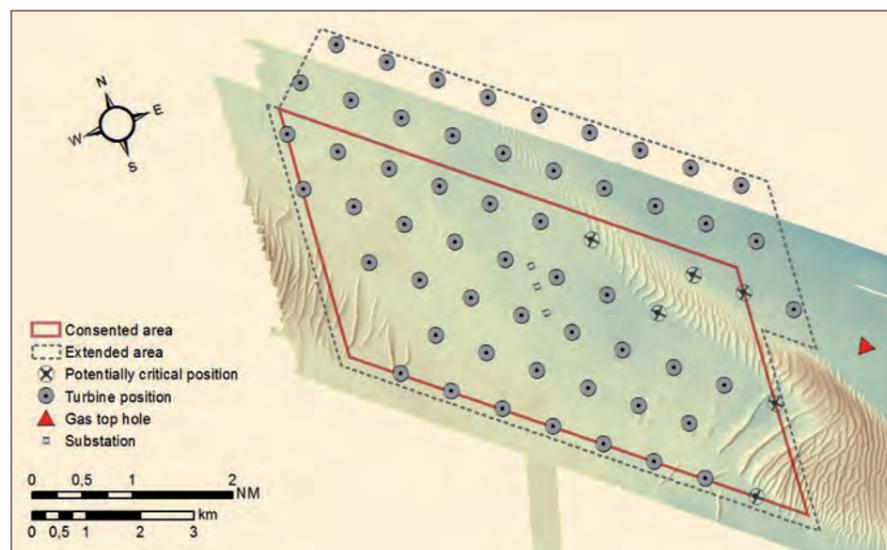
Accordingly, the application for variation has requested:

- An amendment to the red line boundary of the site to provide extra flexibility to locate

turbines away from the high risk areas of mobile sand

- The introduction of new foundation options to offset the risk of instability due to the chalk. These include the use of suction bucket jacket foundations which will only penetrate the first few metres of the seabed, thus avoiding the chalk layer, as well as larger monopole foundations of up to 8.5m diameter to increase surface friction.

A decision related to this application for variation is expected from DECC by the end of 2013



▶ Proposed wind farm site boundary changes

## Offshore survey progress

Offshore site surveys are an important part of the preparations for offshore construction and, with the agreement of all the relevant fishing organisations and individual fishermen, these commenced in April and were completed in early October 2013.

The geophysical survey of the wind farm site and the export cable route to landfall at Weybourne Hope have been completed, and the site area and cable route have been reopened for fishing.

A number of different types of surveys were undertaken – geophysical, geotechnical and seabed and sub-seabed surveys – all of which are now completed, as are the trials of the suction bucket foundations



▶ Weybourne Hope, where the export cable will make landfall

## Preparing for construction – UK supplier opportunities



▶ Personnel Transfer Vessel charter is just one of many UK supplier opportunities

As an integral part of its preparations for offshore construction, Dudgeon Offshore Wind has been working with a number of potential suppliers for many months.

Following the initial identification of such suppliers and their capabilities, a 'Dudgeon Suppliers Day' was held at the 2013 Renewable UK Offshore Wind Conference in Manchester in June 2013. This resulted in the Dudgeon project team identifying potential UK suppliers for all the remaining work packages.

Although the Dudgeon procurement strategy will not be finalised until the project concept is frozen later this year, the procurement process for the wind turbine generators and export cable is already in the tendering phase. The suppliers of this equipment are likely to be appointed in late 2013 or early 2014

## Selecting the location for the O&M base

The Operation and Maintenance phase of the Dudgeon Offshore Wind Farm will need to start as soon as electricity generation commences, which is likely to be in early 2017. A business model which will define the management of all operations and maintenance processes is now under development.

The wind farm will be situated 20 miles off the coast of Cromer in North Norfolk in the often inhospitable waters of the southern North Sea, so safe and efficient daily access to the wind farm is of paramount importance when selecting the port and transportation concepts to be incorporated into the operational business model.

Experience suggests that a quayside Operations and Maintenance base, providing office and warehouse facilities, is likely to be an essential requirement, and the comparative



▶ The location of Lowestoft, Great Yarmouth, Wells and Grimsby in relation to the Dudgeon site

## Onshore cable route surveys

Over the last four months, a number of walk-over surveys have taken place along the Dudgeon onshore cable route and surrounding area.

These ongoing activities include archaeological surveys, habitat mapping and protected species surveys, including great crested newts, water voles and badgers, and they will continue into the Autumn. Where necessary, these surveys will recommence in early Spring next year.

Commencing in October 2013 a number of engineering surveys and archaeological trial trenching works are to be undertaken at specific points along the cable route. Where possible, the engineering surveys will also be undertaken by surveyors on foot, using hand

logistics offered by Lowestoft, Great Yarmouth, Wells-next-the-Sea and Grimsby are currently being evaluated.

Two transportation concepts are under consideration; the first would involve the daily use of the latest generation of high speed personnel transportation vessels (PTVs) to take turbine technicians to the wind farm site. The second concept sees a large 'mother' vessel stationed at the wind farm for up to two to four weeks at a time; technicians can then be ferried directly from the 'mother vessel' or by 'daughter craft' to the wind turbines and the offshore substations. Helicopters stationed near to the coast are also being considered as supplementary support for these concepts.

"It is our intention to be in a position to make our recommendations for the location of the O&M base to the Dudgeon Board of Directors in November-December 2013", said Rune Rønvik, Dudgeon's Operations Manager



▶ A typical field along the Norfolk cable corridor

augers for soil sampling purposes. However, the archaeological trenches will involve the use of machinery, such as JCB mechanical diggers, as the trenches may be up to 1.5 metres deep.

These surveys are an important element of the on-shore cable route preparation process, and the Dudgeon project team is working closely with the landowners affected by the intrusive trenching works to minimise disruption to their farming activities

## Working with landowners across Norfolk



▶ The new onshore substation will be built at Necton, near Swaffham

30 miles of underground cabling needs to be buried at least one metre deep under land belonging to 44 individual Norfolk landowners in order to transmit the electricity generated by the Dudgeon Offshore Wind Farm from landfall at Weybourne Hope, on the coast of North Norfolk, to the new substation to be built at Necton, near Swaffham.

Detailed discussions have been taking place with these landowners over the last 6 months, and legal agreements which will allow this work to be undertaken have now been reached with nearly all 44 landowners.

"Equal treatment of all parties has been an important principle when negotiating with the landowners" said Bjorn Ivar Bergemo, the Dudgeon Asset Manager. "These negotiations involve a number of complex issues, including animal husbandry, crop loss, land drainage, hunting and shooting rights and access to remote farm buildings and holiday homes."

"I am grateful for the landowners' understanding and co-operation, and I hope that we can successfully conclude the outstanding agreements in the very near future."

Regrettably, in October 2013 the project team had to make a Compulsory Purchase Order against the very few remaining landowners in order to acquire the rights to install the onshore cable in due course

## The Dudgeon Team:



### An interview with Bjørn Ivar Bergemo

# What does being Asset Manager involve?

As Asset Manager Bjørn Ivar Bergemo leads the Dudgeon Business Leadership Team and co-ordinates the delivery of the three projects – commercial, facilities and operations.

As Head of the Dudgeon management team, he provides the direction and interface for the different disciplines within the team, working to ensure that all objectives and deadlines are met. He is responsible to the Dudgeon Board of Directors for the establishment of a profitable business case for the Dudgeon Offshore Wind Farm project, and he is required to report progress and results to the Directors on a regular basis.

His role also includes leading the Dudgeon commercial team which is responsible for obtaining all the statutory consents and licences required for a project of this nature. This team is also responsible for stakeholder management and communications, as well as negotiating all the relevant commercial agreements, including those with landowners along the onshore cable route.

Bjørn Ivar is no stranger to the world of offshore wind energy; immediately prior to joining the Dudgeon team he had worked with Forewind Limited, a joint venture company which holds the licence to develop the giant Dogger Bank Offshore Wind Farm, and in which Statoil and Statkraft are two of the major shareholders. In conversation with the editor of this newsletter, he summarised the challenges of his role at Dudgeon Offshore Wind as follows:

“Dudgeon Offshore Wind is working on a number of initiatives to strengthen the business case and to reduce commercial and technical risks. It is a challenge to progress each initiative such that they can all be completed in time for the project to successfully reach its overall milestones.”

Once the Dudgeon Offshore Wind Farm is completed, probably during 2017, Bjørn Ivar expects that the day to day responsibility for the operational wind farm will rest with the person who leads the O&M organisation ■



*(Image taken by CHPV and supplied by Scira Offshore Energy Ltd.)*

▶ Wind turbines at the Sheringham Shoal Offshore Wind Farm, S.W. of the Dudgeon site

## Dudgeon and the Community



▶ Regional economic advantage is likely to be the aim of the Dudgeon Community Fund

A number of organisations have recently approached Dudgeon Offshore Wind to find out when the Dudgeon Community Support Fund, the creation of which was announced in October 2012, will be in a position to consider supporting community initiatives.

In a recent interview for this newsletter, Dudgeon Stakeholder Manager Kari-Hege Mørk said:



We hope that the Dudgeon Community Fund will be in a position to start considering funding applications in early 2015. We are still defining the application criteria, but our thinking is being influenced by the need to enhance workforce education and skills and to strengthen the business supply chain in North Norfolk and Breckland, in order to bring sustained economic advantage to the region. ”

## About the Owners

Dudgeon Offshore Wind Farm is owned by two Norwegian companies, Statoil (70%) and Statkraft (30%).

**Statoil** is an international energy company headquartered in Norway, with 21,000 employees and operations in 36 countries. Building on 40 years of experience from oil and gas production, the company is committed to accommodating the world's energy needs responsibly, applying technology and creating innovative business solutions.

**Statkraft** is Europe's largest generator of renewable energy and is the leading power company in Norway. The company owns, produces and develops hydropower, wind power, gas power and district heating. Statkraft is a major player in European power trading and has 3600 employees in more than 20 countries ■

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