



▶ A2SEA Sea Challenger installing the first Dudgeon turbine

DUDGEON

Offshore Wind Farm

Operated by Statoil

Summer 2017

“ Delivering electricity to the National Grid for the first time is a significant milestone in the life of any offshore wind farm. Dudgeon’s next milestone is the completion of all construction activities later this year. ”

*Rune Ronvik, Operations Manager,
Dudgeon Offshore Wind Farm project /
Head of Statoil Wind Operations Great Yarmouth*

Dudgeon delivers first electricity to UK National Grid

7 February 2017 was a day for celebrating, as this was the day that the first wind turbine generator delivered the first supply of electricity from the Dudgeon Offshore Wind Farm to the UK National grid network.

This was a remarkable achievement, as it was less than 10 months since the first monopile turbine foundation was installed into the seabed some 20 miles off the coast of Cromer in North Norfolk, and less than 4 weeks since this turbine was collected by the A2SEA Sea Challenger jack-up vessel from the new Siemens facility in Hull.

By mid-June 2017, 38 wind turbine generators had been installed at the Dudgeon Offshore Wind Farm of which 36 were supplying electricity to power UK homes. When turbine installation is complete, which is currently anticipated to be around the end of September 2017, Dudgeon’s 67 wind turbines are expected to generate sufficient electricity to power in excess of 410,000 UK homes ■

The journey to power UK homes

Electricity is generated at 690volts by the Siemens 6MW wind turbine generators used at the Dudgeon Offshore Wind Farm. This power is then stepped up to 33,000volts on the wind turbine generators before being transmitted to the Dudgeon offshore electricity substation, which is situated within the wind farm site.



▶ The Necton substation

At the offshore substation, electricity is transformed to 132,000 volts (132kV) and transmitted to shore through two cable circuits to the Dudgeon onshore electricity substation, which has been recently constructed close to the village of Necton, near Swaffham in Norfolk. From there it is transmitted as a 400kV supply into the National Grid UK electricity supply network, providing a clean, renewable source of electricity to UK homes.

The two Dudgeon electricity substations which are an integral part of the journey made by the electricity generated out at sea to reach UK homes are unmanned but under the 24/7 control of the Control Room located in the Dudgeon O&M base in Great Yarmouth ■

Contents

- Page 2 ▶ Life in Dudgeon’s O&M Base
- ▶ Along the onshore cable route to Necton
- ▶ Telescope at Muckleburgh Collection
- Page 3 ▶ Going to work aboard Esvagt Njord
- ▶ Port security
- Page 4 ▶ The Dudgeon team
- ▶ Dudgeon in the Community
- ▶ Stop Press
- ▶ About the owners
- ▶ Contact details

Life in the Dudgeon O&M Base

The onshore manning for the Dudgeon Offshore Wind Farm during its operational phase will involve approximately 30 people, but because of shift work there are likely to be some 20 in the office on a normal day, including security personnel and members of the Siemens team. They provide critically important support for approximately 40 offshore colleagues who are based on the SOV Esvagt Njord.

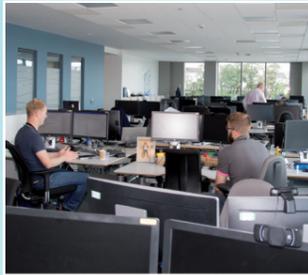


► Rune Rønvik

The Dudgeon O&M team report to Operations Manager Rune Rønvik, who said: *"More than half of the Dudgeon O&M organisation is based offshore, but the team also has personnel in London and Oslo, which brings a different dimension to some of the day-to-day challenges which are faced by every business. However, we have built a flexible team which continues to develop in line with the needs of our growing operation."*

The daily meetings to plan work activity schedules bring together a strong team which includes those responsible for Operations and Maintenance, Health and Safety, Technical Integrity, Marine and Logistics and Control Room.

The Control Room within the Dudgeon O&M Base is manned on a 24/7 basis, and is responsible for both the Dudgeon and Hywind Offshore Wind Farms. Hywind, located off the east coast of Scotland, is a pilot offshore wind farm consisting of five floating wind turbine generators.



► The general office in the O&M Base

Along the onshore cable route from Weybourne to Necton

At 30 miles in length, running from Weybourne on the North Norfolk coast to the new substation at Necton, near Swaffham, Norfolk, the Dudgeon onshore electricity cable is the longest underground cable for an offshore wind farm so far installed in the UK. Its installation, which started in March 2015, has been a complex engineering operation across land belong to 44 Norfolk landowners and farmers.



► Land restored after cable installation



► Cable installation in progress



► Fencing to protect Great Crested Newts during construction

The arrival of greatly improved weather in early Spring 2017 enabled cable contractor Carillion Utility Services to recommence the reinstatement of the top soil, thereby facilitating access for the land drainage specialists to proceed with the installation of the post construction field drainage schemes.

By late June 2017, all the top soil along the length of the cable route had been fully reinstated, and a team from Statoil and Carillion were inspecting the route section by section prior to the issue of the formal documentation handing land back to individual landowners.

Statoil's Mike Corney, Consents and Land Manager for the Dudgeon Offshore Wind Farm, is pleased that the end of onshore construction activities is now in sight:

"So far the reinstatement works have gone well this year, and the bulk of the activity is now finished. There will be a small number of drainage installations to complete after harvest, and the replanting of hedgerows will be completed in November."

He concluded, saying: *"I would like to thank all the landowners and local communities for their tolerance and patience during the disruption which always accompanies a major infrastructure project such as this. Your co-operation has been greatly appreciated."*



► HRH The Duke of Kent formally opened the telescope installation

Telescope at Muckleburgh Collection benefits East Anglia Air Ambulance

Offshore wind turbines are a source of interest to both North Norfolk residents and tourists to the area's coastal villages, and a powerful telescope located at the Muckleburgh Collection of military equipment at Weybourne now provides the opportunity to view the turbines of the Dudgeon, Sheringham Shoal and Race Bank offshore wind farms.

All the monies paid to use the telescope, which was purchased through a generous donation by Statoil, are collected for the benefit of the East Anglia Air Ambulance Service, the charity for which HRH Prince William has until recently been a helicopter pilot.

The telescope installation was formally opened by HRH The Duke of Kent at the end of March 2017

Going to work aboard Esvagt Njord

At 20-32 miles off the coast of Cromer, North Norfolk, the Dudgeon Offshore Wind Farm is further offshore than any other UK offshore wind farm so far constructed, yet for the technicians responsible for the maintenance of the wind farm's wind turbine generators, this is their place of work.

Travelling to site on a regular daily basis was not a practical option at the time the marine solution was selected, so Statoil chartered the 'Esvagt Njord' Service Offshore Vessel (SOV) from Danish support vessel operator Esvagt. The vessel, which is 83.7m long and 17.6m wide, provides 58 cabins to accommodate the vessel crew and the wind farm technicians. It spends two weeks at the wind farm and then returns to the Dudgeon O&M base in Great Yarmouth, Norfolk for crew change and stock replenishment.

Whilst on board the technicians have a large mess room, a day room, a gym, two cinemas/games rooms and an entertainment system at their disposal. There are also changing rooms, PPE (personal protective equipment) storage areas and a laundry facility available to them.

Peter Sommerfield, one of Dudgeon's Vessel Representatives, believes that a high standard of comfort and welfare is good for morale, saying: *"There are clear house rules for living together on the vessel, and to foster ownership we ensure that each technician is allocated their own cabin which they will use each time they come on board."*

The vessel features the Uptime Walk-to-Work system to transfer technicians from the vessel onto the wind turbine generators. This offers improved levels of safety in comparison to other methods of personnel transfer, and between September 2016 and May 2017 over 1,500 transfers were made without incident.



► The Esvagt Njord moored alongside the Dudgeon O&M Base in Great Yarmouth



► The Dudgeon O&M Base from the harbour side



► Part of Esvagt Njord's large Mess room

In order to maximise the working day for offshore workers, a system of staggered shifts is used to reduce the amount of unproductive time technicians spend waiting to arrive at the appropriate wind turbine generator. A working day for a technician is typically as follows:

- 05:30 Breakfast and pack lunch for the day (technicians prepare and pack their own lunches).
- 06:00 Technicians report to office and check on overnight WTG status. Given work orders
- 06:30 Tool box talk before entering WTG on the walk to work gangway
- Technicians will stay on a WTG for most of the day either troubleshooting or carrying out servicing requirements.
- 18:00 Back onto SOV after end of working day and give debrief
- 18:30 3 course dinner with 3 choices available
- 19:30 Relax in gym, cinema or one of the lounges

Peter Sommerfield added: *"Esvagt Njord also features a conference room, four customer offices and a 430m² warehouse, complete with a well-equipped workshop area, for parts and tools, all of which helps make our working days out at sea extremely productive."*

Port security

The International Ship and Port Facility Security Code (ISPS) is a comprehensive set of measures to enhance the security of ships and port facilities.

It was developed in response to the perceived threat to ships and ports, and Dudgeon fully complies with the ISPS code at the O&M Base site, having agreed security measures with

the Department of Transport through the site Port Facility Security Plan. This includes being part of the wider Great Yarmouth Port Security Authority (GYPSA) and attending their meetings.

Dudgeon has a Port Facility Security Officer (PFSO) who is tasked with ensuring compliance with the Port Facility Security Plan and liaising with the Department of Transport and the GYPSA security teams.

The Dudgeon Team:

An interview with Ian Burgess Control Room Manager

Ian explains the importance of the Control Room, saying: *"The Control Room at Dudgeon's Great Yarmouth base is the beating heart of the Dudgeon Offshore Wind Farm. From there, the whole operation of the site is managed, monitored and controlled in real time, until the electricity it produces reaches the National Grid at Necton.*

"It monitors the wind farm's output, and if necessary, limits or adjusts that output. Another vital role is to control marine traffic, personnel movement and transportation of equipment within the wind farm site, activating the work release system that not only gives permission for work to begin, but also records when work is either suspended or complete. Safety is paramount, and this

close monitoring ensures that there are no clashes or work conflicts."

The Control Room also provides a similar service to Hywind, Statoil's floating turbine offshore wind farm which is being constructed off the East coast of Scotland.

Ian goes on to say, *"There are always two people in the Control Room, which*



▶ Ian Burgess

operates 24/7, from a team of 4 Marine Co-ordinators who work shifts of 7 nights, followed by 7 days and then a 14 day rest period. Alongside the Co-ordinators is a team of 7 Control Engineers, whose role at the moment is to oversee the wind farm in its construction phase. Their role will switch to other areas once this phase is complete."

Ian has extensive experience in the electrical industry, having started out 40 years ago as an apprentice electrician. He worked through various roles and has spent the past 20 years in a control room environment. Since joining Statoil, he has recruited and trained the present Control Room team, of whom he is proud to say that 5 are from Norfolk ■

Dudgeon in the Community

During the construction of the Dudgeon Offshore Wind Farm, its Community Fund has been used to support charitable, voluntary and community groups and activities in Great Yarmouth as well as in the communities that have suffered disruption resulting from the onshore construction activities.

39 projects in Great Yarmouth and from Necton in the Breckland district of Norfolk to Weybourne on the North Norfolk coast have been awarded grants amounting to over £230,000 since July 2015. A complete list of the projects which have benefitted from the Dudgeon Community Fund can be found on the Dudgeon Offshore Wind Farm web site at www.dudgeonoffshorewind.co.uk

With the completion of the Dudgeon onshore construction activities, the Dudgeon Community Fund will now use its £100,000 per annum funds to support an education initiative for the benefit of young people living in the Great Yarmouth, Breckland and North Norfolk districts of Norfolk. It is planned that the next issue of the Dudgeon newsletter will carry further details of the initial educational programme to be supported by the Community Fund ■



▶ A grant to Necton Parish Council contributed to the erection of two new bus shelters on the A47 highway

STOP PRESS

2017 Great Yarmouth Maritime Festival

9th-10th September

Statoil will be one of the Sponsors of the 2017 Great Yarmouth Maritime Festival, and the Dudgeon team looks forward to welcoming visitors to the Statoil stand in the Sponsors Marquee.

About the Owners

Dudgeon Offshore Wind Farm is owned by two Norwegian companies, Statoil and Statkraft, and Masdar of Abu Dhabi.

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.

Masdar is Abu Dhabi's renewable energy company advancing the development, commercialisation and deployment of clean energy technologies and solutions. The company serves as a link between today's fossil fuel economy and the energy economy of the future.

Statkraft is a leading company in hydropower internationally and Europe's largest generator of renewable energy. The Group produces hydropower, wind power, gas-fired power and district heating and is a global player in energy market operations. Statkraft has 3600 employees in more than 20 countries ■

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