

# A pioneering project 15 years in the making



The much-celebrated inauguration of Vattenfall's European Offshore Wind Deployment Centre (EOWDC) was a day 15 years in the making for the energy industry. PES brings you a unique report on this exciting, innovative project, not least because of the enormous challenges which had to be overcome and the awareness, ethos and on-going research into the environmental effects.

Originally conceived by Aberdeen Renewable Energy Group (AREG) back in 2003, the pioneering EOWDC is now generating clean energy off the coast of the Granite City. On September 7, Scotland's First Minister, Nicola Sturgeon and Vattenfall's CEO Magnus Hall inaugurated Scotland's largest offshore wind test and demonstration facility. Over 100 business leaders and dignitaries attended the offshore celebration which gave them the opportunity to see the wind farm up close.

Through a series of innovations and cutting-edge technologies, the 11-turbine EOWDC will serve as a test and demonstration facility for offshore wind and lead the drive towards generating competitive wind power globally. In what was a major feat of engineering, all foundations and turbines were installed in the North Sea over a period of just nine weeks.

For the first time in the UK, steel suction bucket foundations were paired with the world's most powerful turbines and deployed on a commercial scale. Each of the foundations weighs approx. 1,800 tonnes and

one was installed in a little over 2.5 hours in what is believed to be the world's fastest wind turbine foundation installation.

The construction phase involved using one of the globe's largest and most versatile floating cranes, the 25,000 tonne Asian Hercules III, to carry out the heavy work. The image of the crane off the North-east coast provided an insight into the scale of the engineering and ambition of the project. Each of the 77m high suction buckets weigh the equivalent of almost ten Boeing 747s and were installed in a single offshore lift by the Asian Hercules III. The process was virtually noiseless and delivered numerous environmental benefits. It allows for faster and smarter installation; suction bucket jacket foundations provide a different option for foundations at challenging sites and decommissioning is easier as the installation process can be reversed.

The turbines at the EOWDC are the world's most powerful deployed and a single rotation of the blades can power the average UK home for a day. Two of MHI Vestas' V164 turbines have been enhanced

to generate up to 8.8MW and the other nine turbines have a capacity of 8.4MW.

First power from the 93.2MW EOWDC was exported onshore via 66kV cabling on the first of July. The project is the first in Scotland to utilise these high voltage cables resulting in less inter-array cabling, less electrical losses and reduced construction costs. The clean electricity generated by the wind farm is exported to the onshore substation at Blackdog, Aberdeenshire. A 92-tonne transformer at the substation site converts the 66kV voltage to 132kV for transmission to SSE's substation in Dyce for connection to the National Grid in Kintore.

Adam Ezzamel, EOWDC project director at Vattenfall, said: 'The EOWDC is supporting the North-east of Scotland's drive to diversify the North Sea and contributing to Aberdeen's status as the energy capital of Europe. From design through construction and continuing into the operations and maintenance phase, we have embraced innovations and challenged industry standards while successfully deploying oil



and gas technology in offshore wind. As a test and demonstration facility, the EOWDC will drive the growth of a global, low-cost offshore wind industry, make the world greener and move us closer to Vattenfall's ultimate goal of a fossil fuel free future.

'The innovations also enabled us to boost the capacity of the wind farm to 93.2MW – the equivalent of more than 70% of Aberdeen's domestic electricity demand. Throughout the EOWDC's 20-year lifespan, the wind farm is expected to displace an average of 130,000 tonnes of CO2 per year – the equivalent of annually removing over 35,000 cars from the UK's roads.

'Each 80m blade is slightly taller than Scotland's famous Wallace Monument and the 164m rotor has a diameter larger than that of the London Eye,' said Ezzamel.

He credited the support of partners and the project team with delivering construction swiftly and safely. 'It has been a monumental effort from Vattenfall and a host of supporters including the Scottish Government, AREG and Crown Estate Scotland to make this project a reality. Throughout construction, our team and contractors had to overcome numerous challenges including an inhospitable seabed and inclement weather. For the milestones of this project to have been achieved in such a short timescale is a testament to the engineering

know-how and collaborative working of everyone involved.'

**Commitment to environmental research**

As well as being a flagship renewables development for Scotland and the energy sector, Vattenfall has created a scientific research and monitoring programme to support understanding of offshore wind's impact on the environment. The €3mn fund

is believed to be the first and largest of its kind. It is facilitating research in to the environmental effects of offshore wind in a real-time environment. Research is currently ongoing into monitoring bottlenose dolphins, salmon, sea trout, sea birds and communities and assessing their interactions with the wind farm. The first round of research groups to receive funding recipients of a share in the fund include:



EOWDC project director Adam Ezzamel



Asian Hercules III lifts the suction bucket jacket foundation from Peterhead Port

**The River Dee Trust, Aberdeenshire, and Marine Scotland Science** which is assessing the interactions between salmon and sea trout with offshore wind technology. The project aims to help provide unknown information on the extent to which offshore wind farms influence salmon and sea trout.

**SMRU Consulting and the University of St Andrews, both St Andrews** who are working collaboratively to improve the understanding of bottlenose dolphin movements along the east coast of Scotland. The project involves undertaking a comprehensive study of bottlenose dolphin movements throughout the development and part of the operational phase of the EOWDC to offer greater insight into bottlenose dolphins.

**MacArthur Green, Glasgow** is measuring connectivity between auk special protection areas populations and offshore wind farms and tracking non-breeding season movements of adult auks. As such, the project aims to demonstrate that this could reduce future uncertainty in impact assessments and improve understanding of how auks engage and co-exist with offshore wind farms. This project will fund a PhD student to work with the research team.

**Oxford Brookes University, Oxford** is assessing the socio-economic impact of

offshore wind on the human environment. The project will analyse the socio-economic effects of the EOWDC from the construction stage through to operations to help better understand how offshore wind developments can maximise the benefits to the region and local communities.

‘The programme will reinforce Scotland’s reputation as leaders in research and development and has the potential to unlock valuable information on offshore wind and its relationship with the environment. It may also inform and benefit industry and policymaking around the world.’ said Ezzamel



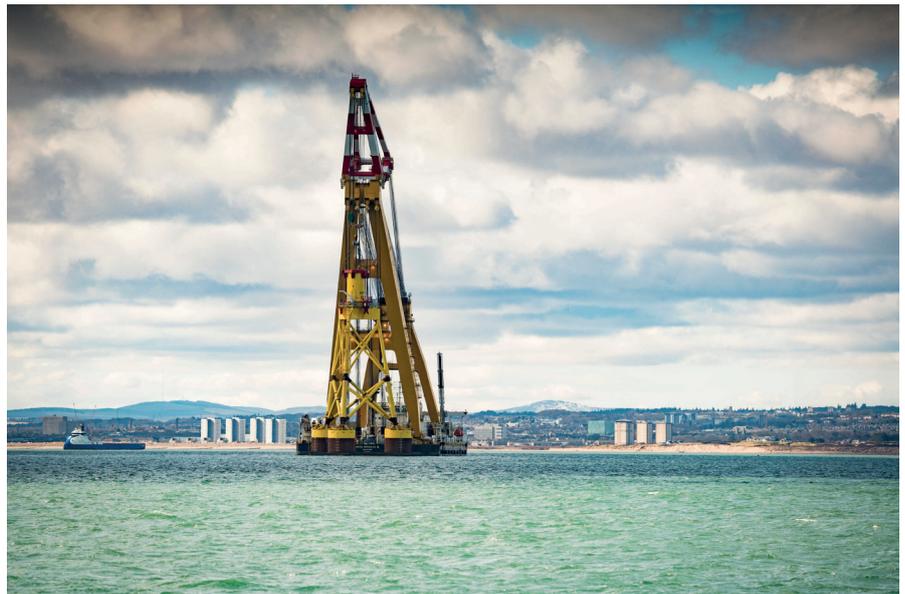
Magnus Hall and Nicola Sturgeon

### A lasting legacy for local people

Through the EOWDC, Vattenfall is committed to securing a lasting legacy in the offshore wind industry, for the environment and the communities of the North-east of Scotland. The developer has partnered with several local organisations in recent years and has established a community benefit scheme to deliver £3mn over the lifespan of the project. The ‘Unlock our Future’ fund aims to enable community empowerment and improve quality of life in the North-east of Scotland. Local champions have formed a decision panel to establish the scheme and will be responsible for annually distributing the allocated £150,000 per year.

Calls for proposals will be in Autumn 2018 and the fund criteria is based on local feedback which has been analysed by leading renewable energy fund expert Dr. Claire Haggett. £15,000 per year will go to the people of Blackdog where the substation is located and Ezzamel expects the benefits of the scheme to be felt long after its 20-year lifespan.

‘Vattenfall has a strong track record in developing community benefit programmes which deliver real value to local people and though this is our first scheme of this nature for an offshore wind farm, we expect the EOWDC fund to be no different,’ commented Ezzamel. ‘Given the ground-breaking nature of the project and the entrepreneurial spirit of the North-east, we hope to attract innovative projects which will have a lasting impact.’



The Asian Hercules III with the first suction bucket jacket foundation in Aberdeen Bay

Vattenfall has invested more than £300mn in taking the EOWDC from vision to reality. The successful completion of the project, which was also supported by a €40mn grant from the European Union, means the Swedish energy group’s total UK operating wind capacity has crossed the one-gigawatt milestone.

The group’s CEO and President Magnus Hall says Vattenfall is in Britain to grow. ‘The success of our wind power investments over the past decade, and the

ambition of Scottish and UK governments to transform the energy and transport sectors, gives us confidence in our UK future. As we forge new partnerships in heat, e-mobility, retail, power distribution and wind over the next ten-years we will be at the forefront of the UK’s decarbonisation of energy.’

<https://corporate.vattenfall.co.uk/projects/wind-energy-projects/european-offshore-wind-deployment-centre/>



Vattenfall EOWDC turbines 2