



EUROPEAN OFFSHORE WIND DEPLOYMENT CENTRE

The European Offshore Wind Deployment Centre (EOWDC) is a ground breaking new facility currently being developed by Vattenfall, Technip and Aberdeen Renewable Energy Group (AREG).

Having already achieved a number of significant milestones, an application for consent for the EOWDC is due to be submitted to Marine Scotland for consideration later this year.

In August last year Aberdeen Offshore Wind Farm Limited was awarded exclusive rights to develop the project in a zone off the city of Aberdeen by The Crown Estate and the following December the project received a grant award from the European Union of up to forty million Euros.

As well as delivering renewable electricity to the national grid, the EOWDC is expected to contribute to improving the competitiveness of the offshore wind sector. This will be achieved through the demonstration of new technologies in a real time offshore environment before their full scale commercial deployment, contributing to risk and cost reduction.

Key objectives of the EOWDC are:

- Deployment of first 'run of production' offshore wind turbines to demonstrate readiness for full scale commercial deployment
- Deployment of innovative foundation, cabling, and electrical technologies and support for associated R&D activities
- Support for innovative research meeting our objectives, possibly including an offshore Ocean Laboratory platform
- Support for a centre of excellence in occupational training and emergency response related to offshore wind
- Support for public and commercial stakeholder education and awareness relating to offshore wind power
- Generation of electricity to satisfy 50% of the domestic demand of Aberdeen

The project team is keen to open dialogue with turbine manufacturers, supply chain companies, Universities and research establishments about the opportunities outlined above.



LOCATION AND BENEFITS

The UK is a major growth market for offshore wind power and is expected to attract considerable inward investment from international manufacturers of wind turbines and other wind farm components who intend to set up factories and create jobs in the UK.

Several of these manufacturers are looking for demonstration facilities as a critical part of their product development process and the EOWDC presents an opportunity for Aberdeen and Scotland to take a leading role in satisfying this demand.

Building on the success of its long term relationship with offshore oil and gas, Aberdeen City and Shire has been transferring applicable skills and experience into offshore renewables for the last ten years and is rightly regarded as the Energy Capital of Europe.

Aberdeen is ideally placed, both in terms of location and supply chain expertise, to drive offshore renewable technologies forward and the EOWDC would be the focal point for the next phase of development for this world-renowned energy industry hub.

Aberdeen Bay was selected for the EOWDC as it is capable of providing ideal conditions, for example:

- Wind speeds likely to be in excess of 8m/s at 60 metres
- Water depth consistent with commercial offshore developments
- Not directly inside any area designated for nature conservation although consideration is being given to areas nearby
- Not within a major international shipping route but consideration is being given to shipping operating in the area
- Proximity to electricity transmission network.

With an anticipated multi-billion pound global spend on offshore wind projects EOWDC could help to stimulate investment and create new UK jobs and economic benefit within a fast growing sector.

The European Wind Energy Association estimates that European employment in wind power will increase to almost 330,000 in 2020 and to 375,000 by 2030, 57% of the latter figure being accounted for by offshore wind (EWEA, 2008).

In the next ten years Round 3 UK and Scottish Territorial Waters offshore wind projects alone will ensure a multibillion UK offshore wind industry.



BASELINE INFORMATION

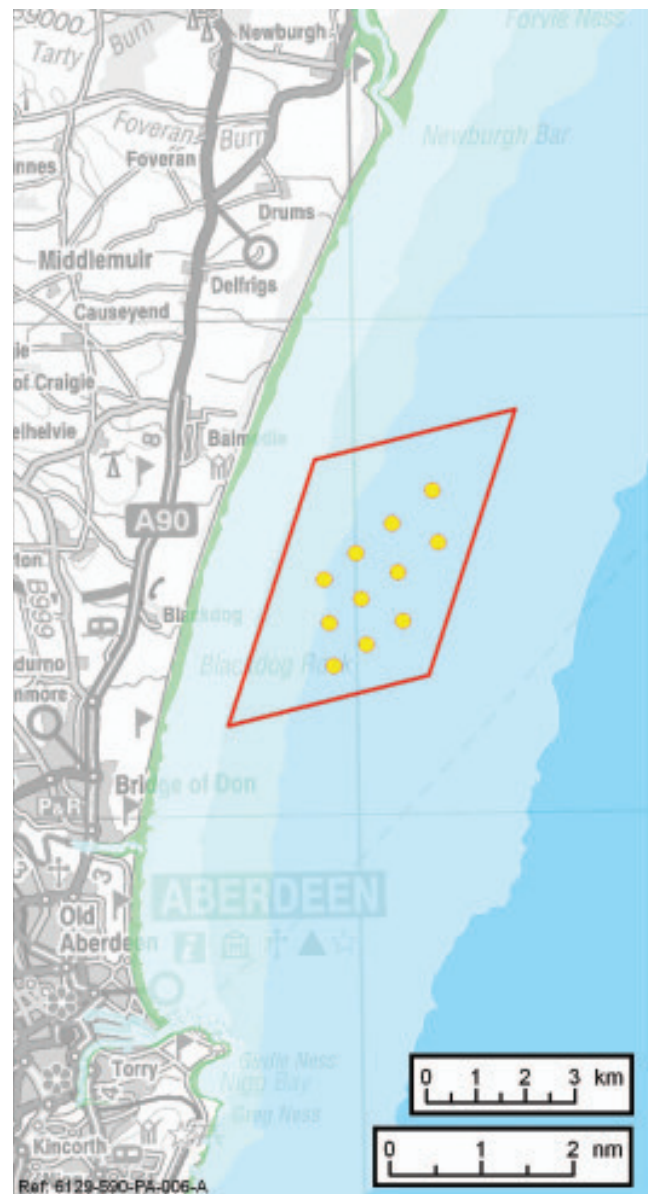
Aberdeen Bay is on the east coast of Scotland. It is characterised by dune backed sandy beaches which are fully exposed to the wave climate of the North Sea. The coastline adopts a crenulated bay formation whereby a sandy embayment has formed between Girdle Ness and the River Don in the south and Collieston in the north.

Offshore, the seabed bathymetry is relatively featureless forming a sloping ramp of sandy sediment. The exception to this is a narrow ridge of unknown origin situated in the region between the offshore and littoral zones. It is possible that this ridge affords some protection to the coast from wave action.

In general, the North Sea climate is characterised by large variations in wind direction and speed, a high level of cloud cover and relatively high precipitation (OSPAR, 2000; DTI, 2004). The local climate along the north east coast is dependent to a large extent on the shelter from winds from the north and east. Predominant winds are from the south and west. Wind strengths along this stretch of coast are variable and generally affected by local topography.

Mean annual rainfall in the central North Sea is 400 – 600 mm (OSPAR 2000; DTI, 2004). Coastal fog (“haar”) is common during spring and summer along the east coast of Scotland, with up to 14 days per month recorded in exceptional years (North Sea Pilot, 1997; DTI, 2004).

Further Information and data is available within the Scoping Report Document which can be accessed via the Vattenfall website.





THE CONCEPT

The vision of the project is:

“To deploy new equipment, systems, processes and initiate R&D to improve the competitiveness of offshore wind energy production, whilst generating environmentally sound, marketable electricity and to increase the supply chain capabilities in Scotland, the wider UK and Europe.”

The EOWDC is targeted at enabling and encouraging increased competition in the European offshore wind supply chain by providing sites for manufacturers to prove new and innovative solutions and allow the acquisition of offshore ‘hands-on’ design, build, operations and maintenance experience in advance of Round 3.

The intent is to install ‘first run of production’ wind turbine systems on a mix of conventional and novel foundations with monitoring and instrumentation for technical and environmental purposes. The project would allow these systems to be built, operated and maintained in the marine environment so that developers, owners and financiers can gain confidence in new designs, allowing the development of the supply chain in this area.

A potential Ocean Laboratory for meteorological masts, environmental monitoring equipment and access training is also being planned. The environmental effects during and after deployments could be closely monitored, potentially through a series of planned surveys, and data collected prior to Round 3 developments being installed.

By providing this infrastructure relatively close to shore, the EOWDC can support training, logistics and accreditation activities to enable efficient and timely deployment for European offshore wind farms.

There is also the possibility of novel electrical design by testing grid connection technologies.

The technologies deployed on the wind farm would offer potential supply chain opportunities for:

- technology “proving” through commercial development and deployment
- logistics and supply chain development and proving
- accreditation and training as commercial offerings, especially health, safety and environmental assessment (HS&E)
- commercial R&D, testing and information dissemination including:
 - long-term environmental monitoring and improvement
 - University level research
 - community, regional, national and international education.



PROPOSED DEVELOPMENT

The key offshore components of the EOWDC are:

- eleven offshore wind turbines and associated foundations
- subsea cables between the wind turbines
- an export cable for connection to the electricity transmission network
- scour protection around foundations and on inter-array and export subsea cables as required
- A potential Ocean Laboratory.

The key onshore components of the EOWDC are likely to be:

- onshore deployment facilities
- the landfall site with associated jointing between the offshore export cable and onshore cable to the onshore substation
- the onshore substation.

Wind Turbines

The wind turbines would be between 4 and 10 MW. The 4 MW wind turbines would have a maximum hub height of 100m above LAT (Lowest Astronomical Tide) and the 10 MW wind turbines would have a maximum hub height of 120m above LAT.

Maximum rotor diameter would be 120m and 150m respectively. It should be noted that the exact specifications for the project are yet to be determined as it is not known yet exactly which wind turbines will be deployed on the site.

The Environmental Impact Assessment has been tailored to each specific assessment so that a worst case scenario has been assessed for every potential impact. The lifetime of the project is dependent upon seabed lease agreements and the current proposal for the length of the lease is 22 years.

Foundations

Potential foundation types include:

- steel monopile
- concrete monopile
- jacket on piles
- tripod on piles
- gravity base structure and
- suction caisson.

A detailed description of the installation and decommissioning methods for each foundation type considered will be included within the Environmental Statement. Any new foundation concepts that may be used would lie within the project envelope used for the purposes of the EIA.

Where this is not the case, foundation details would be discussed with the relevant authorities and would be subject to a separate application. More than one foundation type could be used within this project but for all the foundation options, the structure will extend by approximately 15 to 20m above mean sea level (MSL) such that the base of the wind turbine tower is clear of the most extreme design wave height.

Wind Turbine Dimensions for the Minimum and Maximum Size Machines

Wind Turbine Size	Maximum Hub Height above LAT (m)	Maximum Rotor Diameter (m)	Maximum Tip Height above LAT (m)
4 MW	100	120	160
10 MW	120	150	195

SUPPLY CHAIN PARTICIPATION

- EOWDC is keen to attract pre-commercial (not prototype) deployment of offshore wind turbines and associated technologies
- The Centre would provide the potential to test foundations, cables, installation, manufacture, instrumentation, electrical and environmental factors as well as the turbines
- EOWDC could provide the opportunity to deploy technologies, goods and services ahead of the major development of Round Three Offshore Wind Farms
- EOWDC is therefore keen to speak to turbine manufacturers, supply chain companies, Universities and Research Establishments about their participation.

Ocean Laboratory

The case for an Ocean Laboratory to be located on the EOWDC site will be investigated. This would likely comprise met mast and other meteorological and environmental monitoring equipment. This would be subject to a separate consent application which would be discussed with the relevant authorities and a sustainable business case being made. The Ocean Laboratory could be used by research organisations to allow long term environmental monitoring and other applications using state of the art technology.



CONSENT APPLICATION

OUTLINE PROJECT TIMELINE

- **August 2010**
The Crown Estate awards exclusive rights to develop the project in a zone off the City of Aberdeen
- **August 2010**
A Request for Scoping Opinion is submitted to Marine Scotland
- **November 2010**
Aberdeen City Council and Aberdeenshire Council briefings
November 2010 - Public consultation events in Peterhead, Newburgh, Ellon, Aberdeen and Balmedie
- **December 2010**
EU Grant award is confirmed by the European Union
- **March 2011**
MSP briefing at the Scottish Parliament
- **2011**
Consent Application to Marine Scotland
- **2012**
Contracting
- **2013/4**
Construction

A marine licence will be applied for via the new marine licensing regime administered by Marine Scotland. It is likely that the EOWDC will be one of the first applicants under this new regime specifically designed to streamline the offshore consenting system.

Applications must be accompanied by a detailed scientific assessment of the project's environmental impact, an Environmental Impact Assessment (EIA). The EIA will inform the final layout and engineering design of the project and will consider the following key areas as a minimum:

- Ornithology
- Natural fish (including a detailed analysis of salmon and sea trout)
- Commercial fisheries
- Benthic (seabed) ecology
- Marine mammals
- Aviation
- Ministry of Defence
- Shipping and navigation
- Seascape, landscape and visual impacts
- Marine archaeology
- In-air noise
- Other Marine Users
- Coastal processes (sediment movement).

A key consideration for the project has been consultation with shipping and navigation interests including Aberdeen Harbour.

This is one of the main commercial ports in the North of Scotland and the majority of traffic is from the offshore oil and gas industry. Other harbours of considerable commercial importance include Peterhead and Fraserburgh and all harbours support international trade and offshore activity. Coastal traffic also exists along the Aberdeenshire coast.

Consultation with these stakeholders has taken place throughout the project and the EIA process to date has included:

- Consultation with the Harbour Authority, the Marine Safety Forum and the Maritime and Coastguard Agency
- Radar studies to assess the traffic and vessel movements in the area
- A navigational risk assessment of the area to assess the impacts on ship movements and to identify appropriate mitigation measures
- Consideration of the need for the establishment of safety zones
- Independent scientific studies carried out by some of the UK's leading consultancies into relevant aspects of the local, regional and national environment
- Ongoing close cooperation and dialogue with statutory consultees to ensure that the EIA process adequately addresses the issues associated with offshore development.



VATTENFALL is a leading European energy company. It is currently one of Europe's largest generators of electricity and the largest producer of heat.

Vattenfall currently operates two offshore wind farms, Kentish Flats, off the north Kent coast and Thanet off the north-east Kent coast. Edinbane, an onshore wind farm on the Isle of Skye started generating power in the summer of 2010.

With EOWDC, the Clashindarroch onshore scheme, approved for consent in December 2010, and the planned Aultmore onshore scheme, the north east of Scotland is an important area for the company.

Vattenfall is currently constructing Ormonde Offshore Wind Farm, off Barrow-in-Furness, which will be completed during 2011. The Round 3 East Anglia Offshore Wind Farm is being developed in partnership with ScottishPower Renewables - a project which could deliver up to 7,200 MW in installed capacity and provide clean electricity for the equivalent annual demand of around 4 million UK homes.

The UK, and Scottish waters particularly, are blessed with some of the highest levels of wave and tidal energy to be found on the planet. Vattenfall has teamed up with Edinburgh based Pelamis Wind Power to explore development opportunities off the west coast of the Shetland Islands. The joint venture, called Aegir, hopes initially to develop a project of 10MW.

Vattenfall has agreed to sponsor the development of the Doosan Babcock OxyCoal UK project out of Renfrew and it is part of a group which was awarded UK Government money to investigate Carbon Capture and Storage solutions at Scottish and Southern Energy's Ferrybridge Power Station in West Yorkshire.

For more information please visit www.vattenfall.co.uk



TECHNIP is a world leader in the fields of project management, engineering and construction offering innovative solutions to the global oil and gas industry.

With 23,000 employees, integrated capabilities and proven expertise in underwater infrastructures (Subsea), offshore facilities (Offshore) and large processing units and plants on land (Onshore), Technip is a key contributor to the development of sustainable solutions for the energy challenges of the 21st century.

Through its Aberdeen based operating centre, Technip provides best-in-class subsea products and services to oil and gas companies operating offshore UK, Denmark, the Netherlands and West Coast of Ireland. Further to its established subsea business, Technip is rapidly developing capability to support the growing Offshore Wind sector. The company, which intends to become a major player in this sector, will capitalise upon its expertise in offshore operations, fleet management and project execution to tackle the challenges of the sector. It will also build upon experience gained through recent projects including installation of the world's first full scale offshore floating wind turbine "Hywind" and supporting tidal power generation trial operations at the European Marine Energy Centre in Orkney.

Moreover, Technip was recently awarded a conceptual engineering study for the Havsul Wind Farm situated offshore Norway and, in a move to strengthen its offering, acquired the assets of a prominent marine cable installation company – a clear demonstration of its ambitions and commitment to the sector.

For more information please visit www.technip.com



ABERDEEN RENEWABLE ENERGY GROUP

(AREG) is an innovative public-private membership organisation at the cutting edge of Scottish and UK efforts to build a sustainable renewable energy industry in a fast moving, globally competitive market.

AREG was launched in 2001, when offshore renewables were barely on the UK energy agenda and has been pioneering the renewables revolution ever since. Publicly funded by Aberdeen City Council, this not-for-profit, independent company has its own board of directors drawn from major energy interests across Aberdeen City and Shire.

The North-east's world-class oil and gas expertise and its reputation for innovation and business enterprise are emerging as critical to the development of offshore renewables. Not only does the region have the assets and engineering and technical skills but many oil and gas mechanisms such as recognised codes of practice, sharing of information and supply chain management are transferable.

AREG acts as a catalyst to help transfer these existing energy skills into renewables. It brings together an impressive blend of experience spanning every sector of renewable energy including wind, wave, tidal, hydro, bio, solar, geothermal and fuel cell energy.

AREG has significantly increased participation in the renewables supply chain by promoting the industry through its active and inclusive events, contact with government and industry bodies, access to well established public and private sector networks and activities surrounding its own flagship projects. A large part of the company's success has been in delivering, or otherwise participating in, projects identified as adding economic development value to the region, including the proposed EOWDC.

This dynamic drive combined with a stalwart determination on the part of the AREG team and its robust membership are what makes this partnership, and the region it shares, a success.

For more information please visit www.aberdeenrenewables.com

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Further EOWDC project information is located at: www.vattenfall.co.uk/en/aberdeen-bay.htm

The EOWDC plans contained within this document are subject to consent from Marine Scotland, additional detailed analysis and a final investment decision.

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