European Offshore Wind Deployment Centre

Preliminary Environmental R&D Proposals
Aberdeen Offshore Wind Farm Limited

June 2012

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Aberdeen Renewable Energy Group

A project part-funded by the European Union under the European Economic Plan for Recovery in the field of Energy

PREFACE

On 1st August 2011 Aberdeen Offshore Wind Farm Limited (AOWFL) applied to the Scottish Ministers under Section 36 of the Electricity Act 1989 (as amended), and applied for a Marine Licence under the Marine (Scotland) Act 2010 to construct, operate and decommission an offshore wind farm and deployment centre off the coast of Aberdeen, Aberdeen Offshore Wind Farm, also known as the European Offshore Wind Deployment Centre (EOWDC).

The application comprised an Environmental Statement (ES), prepared in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended) and Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) and followed current best practice.

The August 2011 submission comprises the following volumes:

- Volume 1 – Non-Technical Summary
- Volume 2 – Environmental Statement
- Volume 3 – Figures
- Volume 4 – Technical Appendices

Project Description / Rochdale Envelope

When the ES was submitted to Marine Scotland in August 2011, it had been agreed that further information would be required in support of the application. This further information was referred to as an 'Addendum' to the ES.

An application for an Offshore Wind Farm requires some flexibility to enable subsequent detailed design. This is particularly important in the context of the scheme to be developed as a demonstrator site. In order to carry out an environmental assessment of the project, parameters require to be defined and sufficient information provided to enable the identification of the significant effects. These parameters form the Rochdale Envelope.

At the time of defining the Rochdale Envelope (as submitted August 2011) the project engineers undertook consultation with the supply chain to understand their ambitions and likely details of their future wind turbines which were at an early stage of development. The results of this initial consultation were inevitably a reflection of the supply chain at the time, and the stated ambitions of manufacturers at the time.

In keeping with the concept of a demonstrator site, over recent months, AOWFL has engaged with global turbine suppliers who wish to demonstrate their next generation turbine technology at the AOWF site. AOWFL has commenced a formal commercial process to identify and refine the turbine supply options for the site. This process is at an early and confidential stage, however revised turbine specifications have been made available to the project by the manufacturers.

The overarching objective of the EU grant associated with AOWF, 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 commercial evaluation of prospective turbine suppliers who can meet the EU requirements has revealed that a number of manufacturer's turbines marginally exceed the Rochdale Envelope parameters (as submitted). These turbines would require an adjustment to the tip height of up to 198.5m, and rotor radius of up to 86m as summarised in the table below.

Please note that the maximum dimensions are likely only to be applicable to specific wind turbine locations and are unlikely to be relevant to all 11 turbine locations. Please also note that a minimum clearance of 22m above Mean High Water Springs (MHWS) will be maintained for marine navigation.

Table 1: As submitted Rochdale Envelope and proposed adjusted Rochdale Envelope

Parameter	Rochdale Envelope as submitted	Rochdale envelope (as requested)	Differential
Tip Ht (aLAT)	Up to 195m	Up to 198.5	3.5m
Hub Ht (aLAT)	Up to 120m	Up to 120m	Nil (likely reduction)
Rotor radius (diameter)	Up to 75m (150m)	Up to 86m (172m)	11m (22m)

Environmental Statement Addendum (June 2012)

Addenda are commonly submitted as a project evolves through time to clarify issues, or to provide additional baseline data and updated environmental assessment information. This report (Preliminary Environmental R&D Proposals) forms part of the ES Addendum.

The June 2012 Addendum contains the following information:

- Additional bird and marine mammal baseline data.
- An additional visualisation from Girdleness lighthouse.
- Results of a geo-locational study into golf courses and Round 1 offshore wind farms.
- Requested minor adjustments to turbine dimensions which form a part of the project description information, known as the 'Rochdale Envelope'.
- Supporting statement and representative viewpoints of landscape and visual effects taking account of the adjustments to the Rochdale Envelope and preliminary design principles.
- Updated ornithological collision risk modelling resulting from the updated Rochdale Envelope, updated ornithological impact assessment, and updated Habitats Regulations Assessment.

Where to View the Consent Application

The ES addendum submission may be viewed at the following locations during normal office hours:

Vattenfall Wind Power Ltd 3rd Floor The Tun Holyrood Edinburgh EH8 8AE	Balmedie Library Eigie Rd Balmedie AB23 8YF
Aberdeen Central Library Rosemount Viaduct Aberdeen AB25 1GW	Peterhead Library 51 St Peter Street Peterhead AB42 1QD
Ellon Library Station Road Ellon AB41 9AE	Bridge Of Don Library Scotstown Road Bridge Of Don Aberdeen AB22 8HH

The ES addendum can also be viewed at the Scottish Government Library at Victoria Quay, Edinburgh, EH6 6QQ.

OBTAINING YOUR OWN COPY OF THE PLANNING APPLICATION ADDENDUM

The ES addendum is available on the Vattenfall website:

http://www.vattenfall.co.uk/en/aberdeen-bay.htm

INTRODUCTION TO THIS DOCUMENT

Renewable energy electricity generation is recognised as being vital for decarbonising the global energy system and hence global climate change mitigation. Onshore wind energy is becoming one of the most competitive technologies to date within the EU. Offshore sites offer significant potential opportunities to develop vast wind resource capacity through large scale implementation. However, they pose huge challenges which require technological innovation, industrial and market development, together with high levels of cost reduction and better understanding of how these larger deployments interact with the environment before they become cost competitive with other forms of energy sources. Aberdeen Offshore Wind Farm aims to be able to accelerate the cost reductions needed by the industry and increase the learning and understanding of how these large wind turbines perform and interact with the environment.

The Aberdeen project offers an ideal opportunity to undertake environmental R&D and utilise the results to feed into future Scottish Territorial Waters and Round 3 offshore wind projects. Via the EU grant, a proposal has been made to allocate approximately £2.7 million, funded jointly by the Applicant and the EU to environmental studies until 2016. These environmental studies will be over and above what would be required in a general consenting process and the data and research will be made publically and widely available and includes copies of the comments received from statutory consultees to date.

The environmental research will be accompanied by other R&D activities based in and around the wind farm. These will cover research topics such as; instrumentation, electrical, foundations, metocean, condition monitoring, O&M to name but a few. The exact mechanism of how this research will be conducted has not been firmly established, but herein we are proposing a potential method covering how the environmental R&D might be executed. The mechanisms for the environmental research program have been expedited due to the intrinsic link between marine consents, survey work and the potential environmental research programme. It is hoped that the other R&D topics could follow in a similar format. The document attached herein, outlines our proposed mechanism for delivering and managing any proposed environmental research topics.

Proposals for Delivering Environmental R&D Programme for EOWDC

As submitted to Marine Scotland for comment in February 2012

Attendees:

Nathalie Stevenson, Gavin Scarff & John Price (AOWFL)
Sue Lawrence, Karen Hall & Erica Knott (SNH)
Ian Francis (RSPB)
Nicola Abrams (SEPA)
Sarah Dolman (WDCS)
Jim McKie, Roger May & Andrew Sutherland (MS LOT)
Ian Todd (AREG on behalf of AOWFL)

Gareth Jones, Rory O'Hara Murray (MS Science)
Craig Bloomer & Phil Bloor (Genesis)

Introduction

Aberdeen Offshore Wind Farm Limited (AOWFL) has been developing a wind farm in Aberdeen since 2005. Originally the site was developed as a suitable location for an offshore commercial wind farm. However, in 2008 it was recognised that the site had benefits for testing offshore wind given the location was between 2km – 4km from the shore. The overall vision for the project has therefore been expanded to incorporate a deployment centre and technology enabler alongside a small scale commercial wind farm.

This expanded project will deliver a ground-breaking centre for the acceleration of offshore wind development in Europe. The project will be situated offshore Aberdeen City, which is a recognised centre of excellence for offshore activities. The area has significant industrial skills, developed as a result of North Sea oil and gas experience and expertise, that are available for transfer into the developing offshore wind market to provide innovative solutions to the challenges currently being faced.

The AOWF project, including the deployment centre, is in a perfect position to meet the very tight timescales to commit funding through the European Economic Plan for Recovery (EEPR). The project will be able to deliver the main goals of EEPR, namely to ensure European knowledge, know-how and deployment capability is built and delivered by the fund.

The deployment centre will create an opportunity for the development of innovative designs to overcome the challenges facing the offshore wind industry. It will create an environment that will enable new designs to be tested in a controlled, yet real, environment. Additionally, it will provide independent validation and accreditation for all developers to be able to use. This will have the effect of reducing capital and operating costs with commensurate reductions in risk premiums. The deployment

facility will provide a unique opportunity for the offshore wind industry to ensure that optimal solutions for cost, reliability and capacity are realised, with a high degree of control and risk mitigation, before deployment of the design in much harsher and more challenging offshore sites.

The proposed AOWF project will have two main elements as illustrated below and this document refers specifically to the environmental monitoring R&D

Commercial Wind Farm	Deployment Centre
• Innovative Wind Turbines • Innovative Foundations • Innovative Cabling / laying • Onshore Facilities	• Ocean Laboratory • Environmental Monitoring R&D • Training Opportunities

Figure 1. Key components of the project.

The vision of the AOWFL 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"

At the heart of the project is the interaction between a research, test and training centre with a small, highly innovative, commercially operated and highly instrumented and monitored offshore wind farm. The technologies deployed on the wind farm will provide supporting income to the centre and will offer potential opportunities including commercial R&D, testing and dissemination including:

- Long-term environmental monitoring and improvement.
- University level research.
- Community, regional, national and international education.

This project is targeted at both enabling and encouraging increased competition into the European wind turbine supply chain by providing sites for manufacturers both to prove new and innovative solutions and also to allow the acquisition of offshore "hands-on" design, build and operational and maintenance experience, in advance of Round 3.

This project would allow "first of run" production wind turbine systems to be operated in the marine environment so that developers, owners and financiers can gain confidence in wind turbine manufacturer's new machine designs, allowing the development of the supply chain in this area. The intention is to highly instrument the equipment to provide maximum learning opportunity.

The EOWDC has the potential to promote and enable the deployment of pre-production innovative foundations, or foundation production methods. It may also be available as a platform to test energy storage and/or Flexible Alternating Current Transmission Systems (FACTS) devices.