

# Levenmouth Demonstration Turbine

## Non Technical Summary

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## **PREFACE**

This Non-Technical Summary (NTS) forms part of the Environmental Impact Assessment (EIA) Update Report which accompanies applications submitted by Offshore Renewable Energy (ORE) Catapult to extend the operational phase of the wind turbine which is currently operational at Methil Docks; the Levenmouth Demonstration Turbine (LDT).

The applications being submitted to Marine Scotland - Licencing Operational Team (MS-LOT) are for a variation to the Section 36 Consent under the Electricity Act 1989 and a revised Marine Licence application under the Marine (Scotland) Act 2010.

This NTS is available free of charge. All documents associated with the EIA Update Report are available in an electronic format (as PDF for screen viewing only) on CD/DVD for £20.

The EIA Update Report and associated documents are available for viewing by the public at the following locations during normal opening hours:

Fife Council  
Development Services, Kingdom  
House  
Kingdom Avenue,  
Glenrothes,  
KY7 5LY

ORE Catapult  
Fife Renewables Innovation Centre  
Ajax Way,  
Methil,  
KY8 3RS

**TABLE OF CONTENTS**

**PREFACE ..... I**

**1 INTRODUCTION ..... 1**

**2 PROJECT DESCRIPTION ..... 1**

**3 THE VARIATION ..... 1**

**4 ENVIRONMENTAL IMPACT ASSESSMENT..... 2**

**4.1 Screening..... 2**

**4.2 Scoping ..... 2**

**4.3 Assessment..... 2**

**5 PLANNING POLICY AND LEGISLATIVE CONTEXT ..... 3**

**6 SEASCAPE, LANDSCAPE AND VISUAL..... 3**

**7 NOISE ..... 4**

**8 ORNITHOLOGY ..... 5**

**9 SOCIO-ECONOMICS ..... 5**

**10 CLIMATE CHANGE AND CARBON BALANCE ..... 6**

**10.1 Wind Speeds..... 7**

**10.2 Sea Level Rise..... 7**

**10.3 Storm Surges..... 7**

**10.4 Influence of the Variation on Climate Change ..... 7**

**11 SUMMARY ..... 7**

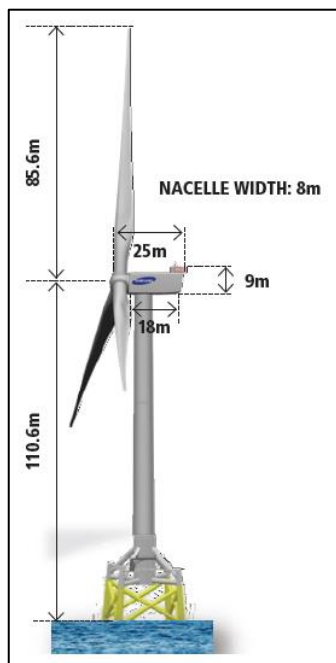
## 1 INTRODUCTION

This Non-Technical Summary (NTS) forms part of the Environmental Impact Assessment (EIA) Update Report which accompanies applications submitted by Offshore Renewable Energy (ORE) Catapult to extend the operational phase of the wind turbine which is currently operational at Methil Docks; the Levenmouth Demonstration Turbine (LDT).

The applications being submitted to Marine Scotland - Licencing Operational Team (MS-LOT) are for a variation to the Section 36 Consent under the Electricity Act 1989 (Reference: 022/OW/SEM) and a revised Marine Licence application under the Marine (Scotland) Act 2010 (Reference: 04617/13 ).

## 2 PROJECT DESCRIPTION

The LDT is a single operational wind turbine and associated infrastructure, located adjacent to the Fife Energy Park (FEP) in Methil. The LDT consists of a 7 megawatt (MW) turbine which measures 196.2 metres (m) from mean sea level (MSL) to blade tip, as shown on Plate 1.



**Plate 1: LDT Dimensions**

The LDT also consists of:

- A personnel bridge, which allows access to the turbine substructure from the FEP;
- An onshore crane pad within the FEP; and
- An onshore control compound which controls operation of the turbine.

The LDT has been operational since 31 March 2014 and currently due to cease operation on 31 March 2019. It provides opportunities for training, technology innovation, and research and development. In addition the LDT also produces low carbon energy, although at lower rates than would generally be expected given the LDTs primary purpose.

## 3 THE VARIATION

ORE Catapult are applying to extend the operational phase of the LDT. The current Section 36 Consent allows the LDT to remain operational for a period of five years following final commissioning, after which time the LDT will be decommissioned.

In order to allow continued technology innovation through turbine testing and research, ORE Catapult are seeking to extend the operational period of the LDT from the currently consented five years to 15 years (the Variation) i.e. an additional ten years of operation.

No physical changes to the LDT are proposed, it is simply an extension to the operational phase.

## 4 ENVIRONMENTAL IMPACT ASSESSMENT

The Environmental Impact Assessment (EIA) is intended to assess the effects likely to result from the Variation, whether these differ from those previously assessed and ultimately whether the effects are significant.

The EIA has been undertaken in accordance with the relevant regulations, namely those detailed below:

- The Electricity Works (EIA) (Scotland) Regulations 2017<sup>1</sup>; and
- The Marine Works (EIA) (Scotland) Regulations 2017<sup>2</sup>.

Collectively the above Regulations are hereby referred to as the 2017 EIA Regulations.

### 4.1 Screening

The first step in the EIA process was undertaken to determine whether an EIA was required. MS-LOT provided an opinion on this in March 2017, confirming that an EIA is requested due to the potential for significant effects. It was also confirmed by MS-LOT that rather than the Variation requiring a new Section 36 application, it can be considered a variation under the Electricity Generating Stations (Applications for Variation of Consent) (Scotland) Regulations 2013<sup>3</sup>.

### 4.2 Scoping

Scoping was undertaken to identify the key environmental issues to ensure that only environmental issues with the potential to experience significant effects were assessed as part of the EIA. It was therefore agreed with MS-LOT that only the following topics would be included in the EIA:

- Seascape, landscape and visual;
- Noise;
- Ornithology;
- Socio-economics; and
- Climate change and carbon balance.

### 4.3 Assessment

The significance of the effects are determined by examining the sensitivity of the baseline or receptor and the magnitude of the impact. Broadly this is done via the matrix shown in Table 1, however professional judgement used to ensure effects are appropriately considered. Where the significance of an effect is indicated as 'Major' or 'Moderate' then the effect is considered to be potentially significant in terms of the EIA Regulations.

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<sup>1</sup> Scottish Government (2017) The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 [Online] Available at: <http://www.legislation.gov.uk/ssi/2017/101/contents/made> (Accessed 12/10/17)

<sup>2</sup> Scottish Government (2017) The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 [Online] Available at: [http://www.legislation.gov.uk/ssi/2017/115/pdfs/ssi\\_20170115\\_en.pdf](http://www.legislation.gov.uk/ssi/2017/115/pdfs/ssi_20170115_en.pdf) (Accessed 12/10/17)

<sup>3</sup> Scottish Government (2013) The Electricity Generating Stations (Applications for Variation of Consent) (Scotland) Regulations 2013 [Online] Available at: <http://www.legislation.gov.uk/ssi/2013/304/contents/made> (Accessed 12/10/17)



**Table 1: Framework for Assessment of the Significance of Effects**

	Sensitivity of Receptor				
Magnitude of Impact	Very High	High	Medium	Low	Negligible
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

Where potentially significant effects are identified, mitigation measures are proposed where possible to avoid, reduce or offset adverse effects. Following consideration of mitigation measures, the effects are assessed once more to determine the level of effects which may remain (i.e. the residual effects).

Consideration is also given to cumulative effects; this is both the interaction of different effects resulting from Variation and/or effects from the Variation interacting with other developments within the vicinity.

Full details of the EIA undertaken for the Variation are presented in the EIA Update Report, which should be read in conjunction with the original Environmental Statement (ES) submitted in 2012 and the 2014 variation of Condition 13. A summary of the findings of the EIA addendum are presented in the following sections of the NTS.

## 5 PLANNING POLICY AND LEGISLATIVE CONTEXT

Since the original EIA was undertaken a number of changes to the legislative and policy which are relevant to the LDT and the Variation. Following a review of the relevant documents, it has been confirmed that the Variation is supported by policies contained within the SESplan Strategic Development Plan (adopted June 2013), the FIFEplan (adopted September 2017) and a number of relevant material considerations (other documents and/or issues which are taken into account when determining an application).

Considerable support can be drawn from the SESplan Strategic Development Plan, the FIFEplan, national planning and energy policy which continue to be wholly supportive of renewable energy development. This recognises the contribution of the LDT to the wider offshore wind industry, as well as the socio-economic benefits provided by the LDT (and extended by the Variation, if permission is granted).

Relevant material considerations also afford significant weight to support approval of the Variation. The LDT encourages and assists the wider offshore wind sector, whilst facilitating skills training and development. In addition, the LDT plays a role in reducing costs associated with offshore wind infrastructure. Benefits arising from the LDT to the offshore industry are considerable, and the Variation will ensure that these benefits can be utilised over an extended operational period.

## 6 SEASCAPE, LANDSCAPE AND VISUAL

The assessment has demonstrated that there are no changes to the baseline that may engender a change in assessment. However, there is a change to the selected viewpoints, which include four additional viewpoints and omits several of the viewpoints used in the 2012 ES. In addition, the revised guidance advises that the emphasis of landscape, seascape and visual impact assessment should be on identifying likely significant environmental effects.

The seascape, landscape and visual impact assessment has assessed the effects of the LDT which is already constructed. For this reason it has been possible to appreciate the full extent of effects without having to rely heavily on visualisations. This has rendered a slightly different result of significant effects resulting in an overall reduction in significant effects.

No significant effects have been identified on the local landscape units, and the Fife Coastal Path is not impacted significantly by the LDT. The main reason for this change to the original assessment is that the LDT sits within an area that has a strong industrial character which is influenced by tall vertical elements and a strong sense of movement with cranes moving; rigs on the firth moving and the general sense of industrial activity. The LDT sits seaward from the shoreline and this ensures that the industrial activity along the coast intervenes in close views. Since the baseline conditions are industrial in character, it is considered that the local landscape character areas are already influenced by that character and the LDT does not 'tip the balance' sufficiently to generate a significant effect. Likewise the visual effects experienced by walkers of the Fife Coastal Path would be already be significantly affected by the industrial setting of the FEP. Whilst the LDT adds to this sense of industrialisation, it does not exacerbate the existing character to such an extent as to be considered significant.

In respect of dwellings facing the LDT within approximately 5 km, it is considered that the movement of the turbine would generate an ongoing and continuous visual effect to the extent that this would be considered significant. Therefore significant effects have been identified on the following receptors which correspond with the original LVIA (2012 ES):

- Houses on the coastal edge of Buckhaven and Methil (30-40 no) and from some houses within these settlements that gain an open view;
- Houses on the southern edge of Kennoway (20-30 no); and
- Local views from a small number of houses on the western edge of Lower Largo (3-5 no).

As noted in the original landscape and visual impact assessment, these visual effects result from the turbine itself and not the other elements of the LDT. It is also notable that the severity and adversity of the LDT will be experienced differently by people depending on their opinions. Where people associate wind turbines with clean energy, this is likely to be experienced less significantly and perhaps even positively. Where the feeling generated is one of dislike, the LDT will be experienced adversely to a greater degree.

## **7 NOISE**

A noise assessment has been undertaken which assess the operational noise of the LDT. The general approach for the assessment of operational noise remains broadly as set out in the 2012 ES, and the revised consent conditions for the scheme following the guidance set out in ETSU-R-97.

Background noise measurements were recorded at three locations around the LDT which was supplemented by a predictive noise model to represent the turbine noise levels from the LDT at operational wind speeds, as well as allowing an assessment of the relative decrease of noise levels at more distant locations. A predictive model was also required to evaluate the noise from the consented Forthwind Demonstration Project as part of the cumulative noise assessment.

Depending on the levels of background noise the satisfaction of the ETSU-R-97 derived noise limits can lead to a situation whereby, at some locations under some wind conditions and for a certain proportion of the time, wind turbine noise may be audible. Nonetheless, if predicted noise levels are within the ETSU-R-97 criteria, operational noise is considered acceptable and not a significant effect; if predicted noise levels are above



the ETSU-R-97 criteria, operational noise is considered as a significant effect. These significant effects require mitigation and is achieved through measures placed on the operation of the LDT.

It is apparent at one location (94 Wellesley Road), the operational levels determined from the LDT exceed the derived night-time limits for a range of wind speeds, 6 to 8 metres per second (m/s) (onshore winds) and 7 to 8 m/s (offshore winds). This would represent a potentially significant operational noise effect, based on the conservative limits derived in the present assessment, which therefore requires mitigation.

In common with most turbine models, the LDT's control system can prevent the turbine operating, in accordance with a schedule of different wind conditions and/or different times of the day. Such a schedule is currently in place for the LDT to mitigate excesses above the limits identified in previous studies and would be implemented throughout the operational life of the LDT, or until such time as noise control modes, which are currently under development, can be successfully implemented.

The assessment of the operational noise associated with the LDT has been shown to comply, following mitigation, with criteria derived in accordance with the extant consent for the LDT and therefore operational noise effects are considered acceptable and therefore not significant in the context of the EIA Regulations.

When considered the cumulative effect of the consented Forthwind scheme, based on the available information, it was concluded that these effects would either be negligible or such that cumulative operational noise would remain below the derived noise limits

## **8 ORNITHOLOGY**

An Ornithology assessment has been undertaken as part of the EIA Update Report which has assessed the effects of the LDT alone and in-combination on the qualifying interests of the Forth Islands Special Protection Area (SPA), the Firth of Forth SPA and the Outer Firth of Forth and St Andrews Bay Complex proposed SPA.

The main potential effect assessed was associated with the potential for displacement of wintering seabirds during operation of the LDT. On the basis of evidence from operational monitoring surveys for the LDT, the potential effects of collision and barrier to movement were screened out of the assessment.

Whilst all SPA conservation objectives have been considered, the assessment has focussed on the objectives relating to the maintenance of the population of the species as a viable component of the SPA and the potential for displacement caused by the operation of the LDT.

The assessment concluded that the effects of the LDT both alone and in-combination with other projects within the region which are already licensed, are not significant for all species considered.

## **9 SOCIO-ECONOMICS**

Since the submission of the 2012 ES, the Department for International Trade (formerly UK Trade and Investment) has published the 'UK Offshore Wind: Opportunities for Trade and Investment' report in 2015. This report highlights the fact that the UK is the global market leader in offshore wind, with, as of 2015, 5.5 gigawatts (GW) of offshore wind installed or under construction, and is on track to deliver a further 5 GW by 2020. The UK offshore wind market has also received significant investments from global investors and is consistently ranked as one of the best places in the world to invest in offshore wind technology.

Between 2014 and 2015, Scotland's total installed offshore wind capacity was 197 MW, with a further 2,284 MW consented during that same period. The LDT forms part of the

'Test and Demonstration Zone' which is marketed as the "largest open access wind turbine". Fife is located only 25 nautical miles from the closest of the proposed Scottish Territorial Waters and Round 3 phases of offshore wind developments announced by the Crown Estate. In addition to offshore wind farms, the Scottish supply chain currently has strengths in maritime engineering and onshore wind energy that allow it to compete for contracts with offshore wind farms elsewhere in the UK and abroad.

With approximately 1,400 wind turbines due to be developed off the east coast of Scotland and three developments in close proximity to the coast of Fife, Fife's experienced supply chain companies are well placed to provide support to all phases of offshore wind development, from manufacturing and construction, through to operations and maintenance.

The LDT is an attractive asset and 'pull' factor to support Fife's success as a manufacturing base. In 2017, Limpet Technology Ltd relocated their main operations from Edinburgh to Fife in order to be closer to the LDT and the opportunities it offers. Limpet Technology is a growing Small and Medium sized Enterprise (SME) and it is likely to expand as the company moves its offshore wind technology into the production and sales phase.

Education support provided by the ORE Catapult, in particular the Fife College Renewable Energy Technician course and the funded post in Levenmouth Academy to encourage pupils to consider the possibilities of careers in Science, Technology, Engineering and Mathematics (STEM) to improve the number of pupils who progress on to positive destinations after leaving school. Without the continued operation of the LDT, the STEM Engagement Officer would no longer be funded by the ORE Catapult and the benefits of associated with this position would likely cease.

There is a clear demand for the continued use of the LDT as a testing and training facility for the offshore wind industry in Fife, Scotland and further afield. There is an economic benefit to extending the operational life of the LDT in a location which is already determined as acceptable.

The quantifiable economic effects associated with the ongoing operations and maintenance will continue as long as the LDT remains operational. The Variation will continue to help to:

- Remove barriers in the UK industrialisation of offshore wind;
- Increase local industry and academic collaboration, thereby building knowledge capacity in the local area;
- Make significant progress in integrated system technology for offshore wind;
- Facilitate the growth and development of the industry, develop industry process, workforce skills and industry culture in the Fife area; and
- Raise the profile of Fife at an international level.

Without the Variation, the LDT will cease operation after five years of operation and the range of socio-economic benefits associated with this, will be lost. Research infrastructure, such as the LDT, will be vital in ensuring the offshore wind energy sector can become cost competitive and therefore sustainable.

## **10 CLIMATE CHANGE AND CARBON BALANCE**

Wind turbines are designed to capture wind energy, they are therefore built to withstand extreme climatic conditions, and are deliberately constructed in exposed locations. However, wind energy developments could potentially be sensitive to significant changes in climatic variables, including atmospheric circulation and land cover changes as well as changes in the frequency of extreme events (e.g. storms), which could damage wind

turbines or alter their efficiency<sup>4</sup>, the vulnerability of the LDT to such events has been considered as part of the EIA Update Report and is summarised below.

### **10.1 Wind Speeds**

Minor predicted changes in summer and winter wind speeds between 2040 and 2069 are highly unlikely to affect the operation of the LDT.

### **10.2 Sea Level Rise**

Due to the time limited nature of the LDT and that it is constructed on a substructure platform approximately 18 m above MSL, it is highly improbable that the LDT will be vulnerable as a result of the minimal predicted increase in sea levels at the Site.

### **10.3 Storm Surges**

The size of storm surge is projected to increase by less than 0.9 millimetres per year over the 21<sup>st</sup> Century. In most locations, this trend cannot be clearly distinguished from natural variability. Due to the temporary nature of the Variation and the fact that the LDT is constructed on a substructure which is 18 m above MSL, it is highly improbable that increases in storm surges will affect the operation of the LDT.

### **10.4 Influence of the Variation on Climate Change**

Based on this average capacity factor, it is expected the Variation would result in the production of approximately 7,150 Megawatt hours (MWh) annually, equating to over 71,000 MWh over the ten year extension. This is the equivalent of approximately 615 tonne of oil equivalent (toe) annually, equating to approximately 6,150 toe over the course of the ten year extension<sup>5</sup>, which is a positive environmental effect. Whilst these numbers appear small in relation to the UK generation from carbon based fuels (30.3 million toe), the research and development and training being undertaken at the LDT will help improve the efficiency of offshore turbines, reducing downtime and increasing energy production from renewable resources.

## **11 SUMMARY**

An EIA Update Report for the Variation has been carried out in accordance with the Screening and Scoping Opinion provided by the MS-LOT and the requirements of relevant good practice guidance, which involves the compilation, evaluation and presentation of any potentially significant environmental effects resulting from the LDT.

The extension of the operational life of the LDT presents an important environmental and economic benefit to the wider renewables by allowing for further testing and development of products and services for the Scottish offshore wind industry, which will in-turn support wider enhancement of skills and expertise relevant to this industry. In addition, the Variation will support the continued operation and proposed long-term expansion and development of FEP.

The Variation is considered acceptable with regards to seascape, landscape and visual; noise; ornithology; and climate change and carbon balance. Any limited environmental effects arising from the LDT are already in existence, and the Variation will simply extend the duration of any effects rather than introduce and new effects. The principle of the LDT has already been established as acceptable by MS-LOT and Fife Council, and when

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<sup>4</sup> Pryor, S.C. and Barthelmie, R.J. (2010). Climate Change Impacts on Wind Energy: A Review. *Renewable and Sustainable Energy Review*, 14(1):430-437.

<sup>5</sup> One toe is the equivalent to 11.63 MWh. International Energy Agency (2017). Unit Converter. Available online at: <https://www.iea.org/statistics/resources/unitconverter/> [Accessed on 03/10/2017]

the considerable socio and economic benefits arising from the LDT are considered, these outweigh the extended duration of the limited environmental effects.