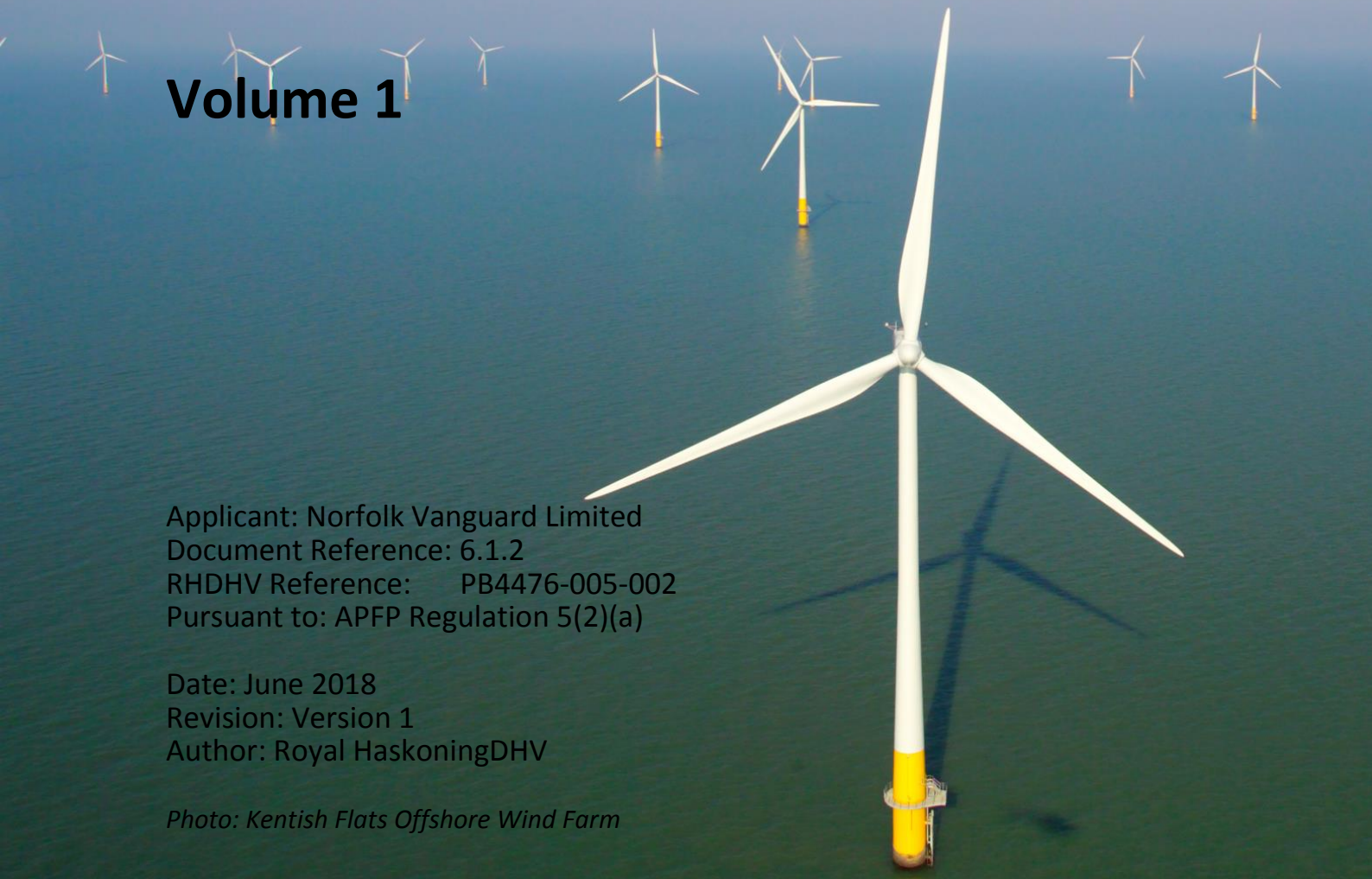
Norfolk Vanguard Offshore Wind Farm

Chapter 2

Need for the Project

Environmental Statement

Volume 1



Applicant: Norfolk Vanguard Limited
Document Reference: 6.1.2
RHDHV Reference: PB4476-005-002
Pursuant to: APFP Regulation 5(2)(a)

Date: June 2018
Revision: Version 1
Author: Royal HaskoningDHV

Photo: Kentish Flats Offshore Wind Farm

Environmental Impact Assessment
Environmental Statement

Document Reference: PB4476-005-002

June 2018

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Date: 8th June 2018

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Date: 25th May 2018

Date	Issue No.	Remarks / Reason for Issue	Author	Checked	Approved
14/03/18	01D	First draft for Norfolk Vanguard Limited review	BH	GK	PP
18/05/18	02D	Second draft for Norfolk Vanguard Limited review	BH/CC/CD	GK	AD
25/05/18	01F	Final for ES submission	BH/CC/CD	GK	AD

Table of Contents

Glossary

CCC	Committee on Climate Change
CEBR	Centre for Economics and Business Research
CfD	Contract for Difference
COP	Conference of the Parties
CO_2	Carbon dioxide
DBEIS	Department for Business, Energy and Industrial Strategy
DECC	Department of Energy and Climate Change
EC	European Council
EU	European Union
FID	Financial Investment Decision
GDP	Gross Domestic Product
GW	Gigawatt
MW	Megawatt
MWh	Megawatt hour(s)
NOAA	National Oceanic and Atmospheric Administration
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OWF	Offshore Wind Farm
TWh	Terawatt hour(s)
UK	United Kingdom

Terminology

The Applicant	Norfolk Vanguard Limited.
The Offshore Wind Farm (OWF) sites	The two distinct offshore wind farm areas, Norfolk Vanguard East and Norfolk Vanguard West.
The project	Norfolk Vanguard Offshore Wind Farm, including the onshore and offshore infrastructure.

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2 NEED FOR THE PROJECT

2.1 Introduction

1. This chapter presents the importance of offshore wind energy, including the need for the Norfolk Vanguard Offshore Wind Farm (herein 'Norfolk Vanguard' or 'the project'), in meeting global, European Union (EU) and United Kingdom (UK) policy commitments for renewable energy and wider policy objectives for UK energy security, decarbonisation and economic growth. Further detail on the relevant UK commitments and the policy and legislation designed to implement them is discussed in Chapter 3 Policy and Legislative Context.

2. The UK requires a range of energy generation infrastructure in order to ensure it has a secure and affordable energy supply and can meet its binding commitments to addressing climate change and to the adoption of renewable technologies as a significant proportion (15% by 2020) of its energy generation mix. The Clean Growth Strategy (Department for Business, Energy & Industrial Strategy (DBEIS), 2017) sets out how the government intends to invest in clean growth technology between 2015 and 2021 including innovation in the power sector (including renewables). Additionally, in March 2018, the UK offshore wind sector committed to a sector deal which will aim to increase offshore wind capacity to 30GW (up from the 13GW currently deployed today) by 2030 (Renewable UK, 2018). The 2030 vision envisages an investment of £48 billion in UK offshore wind infrastructure.

3. Offshore wind, as a source of renewable energy, offers the UK a wide range of benefits from an economic growth, energy security and decarbonisation perspective. Norfolk Vanguard has the potential to make a significant contribution to renewable energy supply and consequently help provide these benefits to the UK and globally. The strategic development of Norfolk Boreas (the sister project to Norfolk Vanguard) by Vattenfall as well as Norfolk Vanguard would further increase this contribution to UK energy supply and help fulfil future increasing demand for renewable energy.

2.2 The Need for Renewable Energy

4. The key drivers underpinning the need for renewable energy are:

- The need to reduce greenhouse gas emissions, including increasing energy generation from low carbon sources to replace high carbon energy sources such as burning coal and gas;
- The need for energy security, including:
  - The need to secure safe, affordable, reliable energy, preferably generated in the UK for the UK market;
  - The need to replace existing ageing energy generation infrastructure;

- The need to meet expected electricity demand whilst meeting climate change commitments; and

- The need to maximise social and economic opportunities for the UK from energy infrastructure investment, as noted in the Clean Growth Strategy (Department for Business, Energy & Industrial Strategy (DBEIS), 2017) and the UK offshore wind sector deal (Renewable UK, 2018) which aims to create 27,000 skilled jobs across the UK (up from 11,000 today) mainly in coastal areas by 2030.

2.2.1 The Need to Address Climate Change and Reduce GHC Emissions

5. In the Overarching National Policy Statement (NPS) for Energy (Department of Energy and Climate Change (DECC), 2011), predictions are made that a continuation of global emission trends, including emissions of greenhouse gases such as carbon dioxide, could lead average global temperatures to rise by up to 6°C by the end of this century. The potential impacts associated with such a global temperature rise include (DECC, 2014):

- Increased frequency of extreme weather events such as floods and drought;
- Reduced food supplies;
- Impacts on human health;
- Increased poverty; and
- Ecosystem impacts, including species extinction.

6. The UK Committee on Climate Change (CCC)[1] (2017) reported that 2016 was the hottest year on record, which represents the fifth time in the 21st century a new record high annual temperature has been set (along with 2005, 2010, 2014, and 2015) (NOAA, 2016).

7. Climate change has been greatly affecting coastal areas in recent years, including in Norfolk, where coastal erosion has become a greater problem now than in the past due to a combination of increasing storm frequency (due in part to climate change) and the already sensitive nature of the Norfolk Coast to this erosion. As such, Norfolk itself will benefit from any efforts to reduce the UK's reliance on fossil fuel based electricity production. An offshore wind farm off the coast of Norfolk would make Norfolk part of a global solution to a problem which directly impacts the county.

8. A commitment by the UK was made during the 21st Conference of the Parties (COP) in Paris in 2015 to pursue efforts to limit the global temperature increase to within

[1] The Committee on Climate Change is an independent, statutory body established to advise the UK Government on emissions targets and report on progress made in reducing greenhouse gas emissions and preparing for climate change.

2°C of the pre-industrial average temperature, with an aspiration for an improved limit of 1.5°C.

9. Power sector emissions fell 17% in 2015 to 50% below 1990 levels. This follows an average annual decrease of 5% in the years between 2009 and 2014. This reduction is largely due to an increase in renewable and nuclear generation, which together met almost half of the UK's electricity demand in 2015 (CCC, 2016a). In order to achieve necessary ongoing reductions in emissions, CCC (2015a) recommended that the UK government should set out an intention to support 1-2GW of offshore wind per year, provided costs continue to fall, with a view to phasing out subsidies in the 2020s.

10. Although the power sector itself is decarbonising through the increased investment in renewable energy, and plans to increase this further, the electrification of heat and transport will require more clean power at the scale at which this transition occurs.

11. The EU and UK legislation that has been put in place to secure a reduction in emissions is outlined in Chapter 3 Policy and Legislative Context.

2.2.1.1 The role of offshore wind

12. The UK CCC, in its advice on the Fifth Carbon Budget, identified that the amount of renewable electricity generated in the UK must double by 2030 if it is to meet its legally-binding climate change targets. The role of offshore wind in delivering this additional capacity of low carbon energy is highlighted by the committee reports, which also recognises that the offshore wind sector is now maturing and showing very significant cost reductions (see section 2.3.1).

13. A dataset produced by the CCC (2016b) calculated cumulative deployment figures (TWh/year) for different forms of electricity generation in the UK from 2015 through to 2030. For offshore wind, the fifth carbon budget target for 2020 is 36.6 TWh/year which doubles in 10 years to 72.4 TWh/year for 2030. Calculations show that Norfolk Vanguard will generate approximately 7.0 TWh/year using the calculation below:

1800MW x 8760h/year x 50% capacity factor[2] x 90% availability[3]

14. Therefore, with a total installed maximum capacity of 1.8GW, Norfolk Vanguard alone has the potential to contribute nearly 10% to the UK cumulative deployment figure for 2030. Through considering Norfolk Boreas alongside this, with an

[2] Capacity factor is the ratio of actual energy produced by the turbine to the maximum capacity of the turbine
[3] Availability is the ability of the wind farm, as a whole, to generate power, given appropriate weather and grid conditions. It is a percentage to account for loss of energy associated with the amount of time that the turbines are unable to produce electricity.

additional capacity of 1.8GW, almost 20% of the UK cumulative deployment figure for 2030 could be fulfilled by the two proposed offshore wind farms.

2.2.2 The Need for Energy Security

15. The UK has been a net importer of electricity since 2010 and imported around 6% of its electricity in 2016 (DECC, 2016).

16. Key issues associated with energy security in the UK are:

- The decline in fossil fuel reserves (in particular North Sea oil and gas)
- The required ongoing closure and decommissioning of existing aging fossil fuel and nuclear electricity generating infrastructure, and
- The need for replacement sources.

17. Many of the UK's older fossil fuel and nuclear plants have either reached the end of their operational life span, are no longer economical to run, and/or do not meet legal air quality limits. The UK Energy Security Strategy estimated that around a fifth of the energy capacity available in 2011 will close by 2020 (DECC, 2012).

18. The Clean Growth Strategy (Department for Business, Energy & Industrial Strategy (DBEIS), 2017) states that the UK Government will continue to invest in electrification of transport, heating and industry. The demands on the UK's energy infrastructure will change as low carbon heating technologies take over from fossil fuels, with a greater dependence on electricity and a potential need for new infrastructure for system balancing and the generation of low carbon gases (DBEIS, 2017). The National Policy Statement for Energy (EN-1) estimates that additional electricity generating infrastructure to ensure adequate supplies will require net new capacity of approximately 59GW by 2025, of which up to 33GW will need to be from renewable sources (DECC, 2011). UK renewable electricity capacity was 33.4GW at the end of 2016 Q3 (DECC, 2016).

19. Reliance on global markets for imported energy leaves the UK vulnerable to spikes in world energy market prices, political pressure and potentially physical supply disruptions. The DECC (2012) Energy Security Strategy outlines the approach to ensuring that consumers have access to energy to meet their demand, and security requirements at prices which are resilient to volatile prices such as those experienced for fossil fuels (price security).

20. The CCC identifies the amount of energy capacity that will be needed to fill the future predicted generation gaps, taking into consideration retirement of high-carbon energy sources and some nuclear sources.

21. If there was no growth in demand during the 2020s, around 25GW of new electricity capacity would be needed, however as demand grows, more capacity will be needed. CCC suggests that if demand grows by 23% (as in the CCC central scenario for demand growth), a total of 40GW of de-rated electricity capacity would be needed (CCC, 2015b).

2.2.3 The Need to Maximise Economic Opportunities

22. The UK is able to continue growth in the offshore wind sector by maximising domestic energy resources and utilising the vast offshore wind resource to which the UK has access. An assessment in June 2017 of Europe's offshore wind resources found that the UK has the greatest potential for offshore wind out of all assessed EU member states in the Atlantic, North Sea and Baltic Sea areas and at present, has the largest installed capacity in the world. The assessment looked at gross resource potential, technical resource potential and economically attractive resource potential, and found that the UK topped all other countries in all three categories (Wind Europe, 2017).

23. A key commitment within the Green Paper: Building our Industrial Strategy (HM Government, 2017) is to "*lead the world in delivering clean energy technology*" and to support innovation in this area. The aim is for "*the UK to be a global leader in innovation, science and research and our Industrial Strategy will help us to deliver our ambitious CO_2 reduction targets while, creating jobs and opportunities for people across the country*". The energy sector in the UK plays a central role in the economy and renewable energy can play a major part in boosting the economy and providing new jobs and skills.

24. The Centre for Economics and Business Research (CEBR, 2012) estimates that by 2030, offshore wind could increase the Gross Domestic Product (GDP) value by 0.6% and support 173,000 jobs. The UK Government's Clean Growth Strategy (DBEIS, 2017) concludes that between 1990 and 2016, the UK reduced its emissions by 42% while the economy grew by 67%. Further analysis has concluded that continuing to develop on this, significant economic benefits can be captured from these decarbonising trends. By taking no action, the UK economy could miss out on a potential low carbon economy growth of 11% per year between 2015 and 2030 (four times faster than the average 2.7% growth rate in UK GDP) (DBEIS, 2017).

25. During Greg Clark's (Secretary of State for Business, Energy and Industrial Strategy) speech at Energy UK in November 2016 he made clear that "*the debate about whether to reduce emissions is over"* and that there is "*huge economic opportunity of climate change action for UK businesses*". The speech also particularly referenced

the east coast of England as an area where the offshore wind industry is contributing, and will continue to contribute, to the local economy.

26. The UK has a strong supply chain for offshore wind. The Green Paper: Building our Industrial Strategy (HM Government, 2017) focusses on delivering affordable energy and green growth. The offshore wind supply chain, for example the Siemens' factory in Hull, plays a key role in delivering this growth strategy.

27. According to the 2017 Report on Offshore Wind UK Content (RenewableUK, 2017), 48% of the total expenditure associated with UK offshore wind farms was spent in the UK in 2015. The UK content of expenditure during the development stage and operation of offshore wind projects was 73% and 75% respectively in 2015, whereas during manufacturing and construction the UK content was 29%. (RenewableUK, 2017)

28. The offshore wind industry presents an opportunity to utilise and further develop the UK's maritime engineering skills, particularly during a time when other industries are in decline (such as shipbuilding and North Sea oil), in order to secure supply chain and other employment opportunities in the UK. The importance of maximising opportunities for the involvement of local businesses and communities in offshore wind has been highlighted as a key success factor for the sector in the UK (The Crown Estate, 2014). As offshore wind supply chains are developing mainly in areas of low economic productivity, which have significant socio-economic challenges, the benefit to local communities and businesses is very important.

29. The replacement of existing infrastructure with new technologies also represents significant investment in the UK economy.

30. Offshore clean energy is supported by the New Anglia Local Enterprise Partnership for Norfolk and Suffolk (New Anglia LEP, 2015) due to the economic benefits the sector brings to Norfolk and Suffolk. The aim of New Anglia LEP is to lead economic growth and job creation in these areas by 2026.

2.3 Benefits of Offshore Wind Energy

31. The UK is well placed to lead the deployment of offshore wind with an estimated 40% of the total 2020 projected European offshore wind generation capacity (Green Alliance, 2014; Wind Europe, 2016), and over a third of the total European potential offshore wind resource (Energy Technologies Institute, 2013) making it one of the most globally attractive locations.

32. The key benefits of offshore wind energy as a contributor to the renewable energy mix are as follows:

- Diversification and security of home-grown energy generation capacity which makes use of an abundant source of energy;
- A technology with potential to make significant and rapid contributions to the national renewable energy targets;
- Economic development and job creation, both within the UK and further afield within the supply chain; and
- Very low lifetime CO_2 emissions per unit of electricity generated.

33. Currently there are over 5.1GW of operational offshore wind capacity in UK waters, making the UK a world leader in offshore wind energy (RenewableUK, 2017). In addition, a further 14.2GW of capacity is either under construction, has government support or has been consented (The Crown Estate, 2017).

34. The continued development of offshore wind within the UK is therefore seen as critical to ensuring that the UK and Europe are able to meet their binding energy and climate change targets.

2.3.1 Cost of Offshore Wind

35. Energy from offshore wind has previously been considered as being an expensive alternative to more conventional forms of energy generation such as coal, gas and nuclear.

36. However, the results of the latest Contract for Difference (CFD) auctions announced on the 11th September 2017 showed an unexpected dramatic fall in the cost of offshore wind for projects which will be realised over the next several years. The cost of offshore wind, as measured by the CFD auction prices, has reduced by almost 50% (from £105 to £57.50/MWh) in 2 years, making offshore wind one of the most attractive and cost-effective methods of generating large quantities of low carbon energy. Norfolk Vanguard Limited is committed to ensuring that the design of Norfolk Vanguard will allow it to provide a low cost of energy

2.4 Norfolk Vanguards' Contribution to Meeting Targets

37. If built, Norfolk Vanguard would have a design life of approximately 35 years, after which it may be repowered (subject to separate consenting). During its operation the project would contribute to reaching global, European and national targets on CO_2 reduction and renewable energy production.

38. In line with the Kyoto Protocol (see Chapter 3 Policy and Legislative Context), signatory states, including the UK, have developed national targets for energy generation from renewable sources. Additionally, as part of the Paris 2015 Commitments, the EU pledged (as the UK was still an EU member at the time, the UK was part of the pledge) to have at least a 40% domestic reduction in greenhouse

gases by 2030 (compared to 1990 levels) (European Commission, 2017) and Norfolk Vanguard would contribute towards these targets.

39. European energy policy (see Chapter 3 Policy and Legislative Context) recognises that the use of renewable energy contributes significantly to limiting climate change, and plays a part in securing energy supply and creating employment.

40. Targets for reduced greenhouse gas emissions and the use of renewable energy have been translated in UK policy and legislation (see Chapter 3 Policy and Legislative Context) through the UK Climate Change Act which contribute to the incentive to establish the former East Anglia Zone and subsequently, Norfolk Vanguard.

2.5 Summary – The Need for Norfolk Vanguard

41. One of the key drivers of the policies and government initiatives which support the development of renewable energy in the UK, Europe and further afield is the recognition of the need to transition to low carbon economies. The generation of utility-scale quantities of electricity from renewable energy sources can have a direct and measurable effect on climate change and in meeting the UK's climate change and emissions reduction targets.

42. Norfolk Vanguard would be one of the biggest offshore wind projects in the world and would make a large contribution to the achievement of national renewable energy targets (see section 2.2). Norfolk Vanguard and Norfolk Boreas together have the potential, at today's level of UK carbon emissions from the power sector, to prevent more than 4,000,000 tCO_2 from entering the atmosphere.

43. Norfolk Vanguard therefore represents a significant beneficial impact in terms of the UK's contribution to global efforts to reduce the effects of climate change.

44. Moreover, Norfolk Vanguard would have a direct positive impact by providing up to 1,800MW of renewable energy, securing supply for up to 1.3 million UK households. This is the equivalent of 2% of the UK's annual energy demand, or 25% of the East of England's electricity demand (domestic, commercial and industrial) (Department for Business, Energy and Industrial Strategy, 2016).

45. The project would reduce carbon emissions and contribute to the economy by providing jobs during all phases of the proposed project. In addition, Norfolk Vanguard Limited is committed to bringing down the cost of offshore wind, with the aim of making Norfolk Vanguard one of the lowest cost sources of new power generation when operational.

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