



# Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions

Preliminary Environmental Information Report

**Volume 1**

Chapter 2 - Need for the Project

April 2021

Title:	
<b>Dudgeon and Sheringham Shoal Offshore Wind Farm Extensions Preliminary Environmental Information Report Chapter 2 Need for DEP and SEP</b>	
Document no.: PB8164-RHD-ZZ-XX-RP-Z-0010	
Date:	Classification
29 <sup>th</sup> April 2021	<b>Final</b>
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## Acronyms

BEIS	Business Energy and Industrial Strategy
bn	Billion
CCC	Climate Change Committee
CfD	Contracts for Difference
CO <sub>2</sub>	Carbon dioxide
COP	Conference of the Parties
CSSR	Climate Science Special Report
DECC	Department of Energy and Climate Change
DEP	Dudgeon Extension Project
EU	European Union
FTE	Full-time equivalent
GVA	Gross value added
GW	Gigawatt
m	Million
MW	Megawatt
MWh	Megawatt hour
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
O&M	Operation and Maintenance
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
SEP	Sheringham Shoal Extension Project
UK	United Kingdom
UN	United Nations

## Glossary of Terms

Applicant	Equinor New Energy Limited
Climate change	A change in global or regional climate patterns. Within this chapter this usually relates to any long-term trend in mean sea level, wave height, wind speed etc., due to climate change.
Contracts for Difference (CfD)	This scheme is the UK government's main mechanism for supporting low-carbon electricity generation.
Decarbonisation	The reduction or removal of carbon dioxide from energy sources.
Dudgeon Offshore Wind Farm Extension site	The Dudgeon Offshore Wind Farm Extension offshore wind farm boundary.
The Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
Greenhouse gas emissions	Natural and industrial atmospheric gases that trap heat from the Earth and warm the surface causing global warming and climate change, including carbon dioxide, nitrous oxide, and methane and perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride.
Natural capital	Natural assets that directly or indirectly produce value to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions.
Offshore export cables	The cables which would bring electricity from the landfall to the onshore substation. 220 – 230kV.
Offshore substation platform (OSP)	A fixed structure located within the wind farm area, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Pre-industrial era	Considered to be 1850-1900.
Sheringham Shoal Offshore Wind Farm Extension site	Sheringham Shoal Offshore Wind Farm Extension offshore wind farm boundary.
The Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension site as well as all onshore and offshore infrastructure.
Strike price	The minimum price developers will be paid for electricity for the duration of the contract for difference.
UK content	Goods, manufacturing or services contributed by any company with headquarters in the UK.

## 2 NEED FOR THE DEP and SEP

### 2.1 Introduction

1. This chapter explains the need for the development of the Dudgeon Offshore Wind Farm Extension Project (DEP) and the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) in meeting United Kingdom (UK) legal decarbonisation targets and policy commitments for renewable energy and the wider policy objectives for UK energy security, decarbonisation and economic growth.
2. The UK Government recognises that electricity generation from renewable sources is an important element in the Government's development of a low-carbon economy. In 2015, the UK Government committed to pursue efforts to limit the global temperature increase from climate change to within 2°C of the pre-industrial average temperature, with an aspiration for an improved limit of 1.5°C at the 21<sup>st</sup> Conference of the Parties (COP) in Paris (the Paris Agreement). In line with the Kyoto Protocol, signatory states including the UK, have developed national targets for energy generation from renewable sources. The Climate Change Act, passed in 2008, committed the UK to reducing greenhouse gas emissions by at least 80% by 2050 when compared to 1990 levels. This target was amended by the Climate Change Act 2008 (2050 Target Amendment) Order 2019 to a reduction of net emissions by 100% by 2050 relative to 1990 levels to make the UK a 'net-zero' emitter.
3. DEP and SEP will contribute to meeting UK Government objectives of delivering sustainable development to enable decarbonisation, ensuring the energy supply is secure, low-carbon and providing benefits to consumers.
4. The relevant underpinning policy and legislation are detailed in **Chapter 3 Policy and Legislative Context**.

### 2.2 The Need for Renewable Energy

5. The key drivers underpinning the need for offshore wind power projects are:
  - The need to reduce greenhouse gas emissions;
  - The need for energy security;
  - The need to maximise economic opportunities from energy infrastructure investment in the UK; and
  - The need to produce affordable energy.
6. The Energy White Paper provides further clarity on the Prime Minister's measures and puts in place a strategy for the wider energy system targeting 40GW of offshore wind by 2030.
7. Overarching National Policy Statement for Energy (NPS EN-1) (Department of Energy and Climate Change (DECC, 2011) sets out national policy for energy infrastructure. Within the next forty years the need to electrify large parts of the industrial and domestic heat and transport sectors could double demand for electricity. To meet emissions targets, the electricity being consumed will need to be almost exclusively from low carbon sources.

## 2.2.1 The Need to Reduce Greenhouse Gas Emissions

8. The global average surface temperature over the decade between 2006-2015 was 0.87°C (+/-0.12°C) warmer than the pre-industrial period (considered to be 1850-1900) with the average annual temperature increase for England 1°C (Committee on Climate Change (CCC), 2019b).
9. The 2019 Progress Report (CCC, 2019a) predicts that by 2050, annual temperatures in the UK are expected to increase between 0.5 and 2.7°C above the 1981 - 2000 baseline, depending on the pathway of global emissions.
10. Latest predictions, based on a 'business-as-usual' greenhouse gas concentration scenario, suggest global air temperatures could rise up to 5°C above pre-industrial levels by 2100 (CSSR, 2017).
11. UK Climate Change Risk Assessment recognised six key climate change risks for the UK as identified by the Adaptation Sub-Committee. The priority risks that the UK faces associated with climate change were identified as being:
  - flooding and coastal change risks;
  - shortages in public water supply;
  - risks to health, wellbeing and productivity;
  - risks to natural capital and our ecosystems;
  - risks to food security and trade; and
  - new pests and disease (HM Government, 2017c).
12. Vulnerability and exposure to climate change are increasing across a range of priority areas including: terrestrial and freshwater habitats; development in flood risk areas; risks to health from heat and cold; and risks to health from changes in air quality. (CCC, 2019b).
13. The commitments made by the Paris Agreement to limit global temperature increase were ratified by the UK foreign secretary in November 2016 and implemented through the fifth UK Carbon Budget. This commits the UK to a 57% reduction in carbon emissions by 2032, compared to emission levels in 1990 (BEIS, 2020). Most recently, in line with the recommendation of the CCC and the sixth Carbon Budget, the UK government has announced that it will set the world's most ambitious climate change target into law to reduce emissions by 78% by 2035 compared to 1990 levels (BEIS, 2021).
14. However, the world is not currently on track to meet the long-term temperature goal set out in the Paris Agreement, consistent with a low emissions pathway (CCC, 2019b). In 2019, total UK greenhouse gas emissions were provisionally 45.2% lower than in 1990 and 3.6% lower than 2018 (BEIS, 2020). This is mainly as a result of changes in the fuel mix used for electricity generation, away from coal and towards renewables.

15. The Queen's Speech on 19 December 2019 (HM Government, 2019b) confirmed that Government will continue to take steps to meet the world-leading target of net zero greenhouse gas emissions by 2050, and will continue to lead the way in tackling global climate change, hosting the COP26 Summit in 2021. The Government announced in the 2019 Queen's Speech that the UK's target has been raised to developing 40GW of offshore wind energy by 2030 (HM Government, 2019b). The CCC has also recommended that the UK Government should support 1-2GW of new offshore wind per year in the 2020s (CCC, 2015). More recently, the CCC report on recommendations for achieving net zero states that 75GW of offshore wind could be required to reach net zero by 2050 (CCC, 2019b).
16. NPS EN-1 (DECC, 2011) reflects the UK commitment to the legally binding targets to cut greenhouse gas emissions and recognises that future large-scale renewable energy generation is likely to come from offshore wind projects. NPS EN-1 (Paragraph 3.3.15) reinforces the need for new electricity Nationally Significant Infrastructure Projects (NSIPs) and their urgency:
 

*“In order to secure energy supplies that enable us to meet our obligations for 2050, there is an urgent need for new (and particularly low carbon) energy NSIPs to be brought forward as soon as possible, and certainly in the next 10 to 15 years, given the crucial role of electricity as the UK decarbonises its energy sector.”*
17. The international and UK legislation that has been put in place to secure a reduction in emissions is outlined in **Chapter 3 Policy and Legislative Context**.
18. Renewable capacity has grown fivefold since 2010, driven by the deployment of wind, solar and biomass. The UK had 10GW of operational offshore wind by 2019, up from just over 1GW in 2010. DEP and SEP will have a maximum export capacity of up to 448 megawatts (MW) and 338MW respectively (up to 786MW in total). This will therefore contribute to meeting the UK Government's ambitious target of 40GW of generating offshore wind energy by 2030. This will help to alleviate the risks associated with climate change such as flooding, water supply shortages and risks to health, food security and productivity and trade. DEP and SEP will provide an important element for the UK to achieve the target of net zero greenhouse gas emissions by 2050.

### 2.2.2 The Need for Energy Security

19. Energy security is about ensuring secure, reliable, uninterrupted supplies to consumers, and having a system that can effectively and efficiently respond and adapt to changes and shocks. It is made up of three characteristics: flexibility, adequacy and resilience (BEIS, 2017). The reduction in fossil fuel consumption will help improve energy security.
20. NPS EN-1 recognises that it is critical that the UK continues to have secure and reliable supplies of electricity as the transition to a low carbon economy is made. EN-1 also states that the Secretary of State should:
 

*“give substantial weight to the contribution which projects would make towards satisfying this need” (paragraph 3.2.3).*
21. EN-1 sets out that the projected total need for new capacity from renewable sources is 33GW by 2025.



22. The UK Government recognises the importance to businesses and households of access to an affordable, secure and sustainable supply of energy:
 

*“Where applicable, national objectives with regard to reducing energy import dependency from third countries, for the purpose of increasing the resilience of regional and national energy systems”* (BEIS, 2019b).
23. Overall net energy import reduced in 2018, accounting for 36.0% of the total energy used in the UK. Total energy production increased 2.9% from 2017, driven by growth from primarily oil, wind, solar and bioenergy and waste (BEIS, 2019a). However, with declining fossil fuel reserves and ageing nuclear power infrastructure, there remains a need for new energy sources. Electricity demand in the UK is likely to rise during the 2020s as a greater proportion of the heat and transportation systems electrify. NPS EN-1 has predicted a doubling or even tripling in demand.
24. 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, 2012a). Closure of fossil fuel generator and nuclear plants, most notably coal and nuclear, is expected to intensify, with further predicted losses of 19 to 22GW (by 2025), over and above the 22GW anticipated by the NPS in 2011; meaning a total loss from these sources of 41 to 44GW (BEIS, 2018).
25. DEP and SEP will help to counteract these losses of energy by generating clean, sustainable and secure energy from within the UK, towards meeting the UK’s needs for greater energy demand.

### 2.2.3 The Need to Maximise Economic Opportunities

26. The UK Clean Growth Strategy (HM Government, 2017a) recognises that actions and investments will be needed to meet the Paris Agreement commitments and that the shift to clean growth will be at the forefront of policy and economic decisions made by governments and businesses in the coming decades. This creates enormous potential economic opportunity – an estimated \$13.5 trillion of public and private investment in the global energy sector alone will be required between 2015 and 2030, if the signatories to the Paris Agreement are to meet their national targets (BEIS, 2017).
27. In 2017, ORE Catapult undertook analysis of the UK offshore wind supply chain and estimated the current and future potential UK content of offshore wind projects as: 32% in 2017; 50% by 2020; and 65% by 2030. In the UK, the gross value added (GVA) to the UK per GW installed, assuming 32% UK content, has been estimated as £1.8bn and is projected to increase to £2.9bn by 2030 – if 65% UK content can be achieved (assuming that 19GW installed capacity is reached) (ORE Catapult, 2017a). It is estimated that the total (domestic and export) market for UK-provided offshore wind could exceed £10.5bn by 2050 and reach £4.9bn annually by 2030 and £8.9bn by 2050 (under a high scenario) (ORE Catapult, 2018).

28. According to RenewableUK's Offshore Wind Industry Investment in the UK report (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).
29. The UK is positioned to continue growth in the offshore wind sector by maximising domestic energy resources and utilising the vast offshore wind resource which the UK holds. The UK also has a strong supply chain that continues to expand to support the growth in offshore wind.
30. The Green Paper: Building our Industrial Strategy (HM Government, 2017b) focusses on delivering affordable energy and green growth in the UK. A key commitment within the Green Paper is for the UK to become a leader in delivering clean energy technology and to support innovation in renewable energy. 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<sub>2</sub> reduction targets while, creating jobs and opportunities for people across the country”.*
31. The energy sector in the UK plays a central role in the economy. Renewable energy can play a major part in boosting the economy and providing new jobs and skills.
32. The offshore wind industry in the UK provides important employment opportunities. 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 wind energy sector in the UK (The Crown Estate, 2014). Low carbon businesses and their supply chain have created over 430,000 skilled jobs in the UK with 7,200 jobs directly in offshore wind (BEIS, 2020b).
 

*“Offshore wind has become a key part of the UK economy, creating much needed jobs not only in coastal communities like Hull, Grimsby and Great Yarmouth, but also across the country in the ever-expanding supply chain. A huge number of British companies are heavily involved in building the UK's world-leading offshore wind sector.”* (RenewableUK, 2017).
33. The UK Government's Industrial Strategy (HM Government, 2017b) sets out a plan to transform offshore wind generation, making it an integral part of a low-cost, low-carbon, flexible grid system and boost the productivity and competitiveness of the UK supply chain. These are to be realised through an industry investment into the Offshore Wind Growth Partnership of up to £250m to support better, high-paying jobs right across the UK (BEIS, 2019b).
34. The Offshore Wind Sector Deal builds on the UK's global leadership in offshore wind, maximising the advantages for UK industry from the global shift to clean growth (BEIS, 2020b). The Government's higher target for 40GW by 2030 as announced in the 2019 Queen's Speech (HM Government, 2019b) demonstrates the Government's recognition of the need to accelerate progress towards net zero emissions. The UK Government Ten Point Plan supports the industry's target to achieve 60 per cent UK content by 2030. The offshore wind commitments will enable the offshore wind sector to support up to 30,000 direct jobs and 30,000 indirect jobs in ports, factories and the supply chains by 2030.

35. Most recently, in a letter to Prime Minister Boris Johnson, the CCC stressed that after the COVID-19 crisis actions towards net-zero emissions and to limit the damages from climate change will help rebuild the UK with a stronger economy and increased resilience (CCC, 2020). The CCC has advised UK Government that reducing greenhouse gas emissions and adapting to climate change should be integral to any recovery package.
36. DEP and SEP will provide not only investment, but will also support the development of the supply chain, a skilled workforce and provide employment. Details of the anticipated expenditure from the construction and operation of DEP and SEP (direct and indirect) are provided in **Section 2.4 and Chapter 29 Socio-Economics and Tourism**.

#### 2.2.4 The Need to Produce Affordable Energy

37. In order to help meet the targets described in the sections above, renewable energy needs to be affordable. The UK has a world leading offshore wind sector and is well placed to benefit from further investment in renewables innovation to accelerate cost reduction. The Government, in partnership with the Research Councils and Innovate UK, expects to invest around £177 million to further reduce the cost of renewables, including innovation in offshore wind turbine blade technology and foundations.
38. Through offshore wind developer-led innovation there has been a significant reduction in the levelized cost of energy in recent years. The Clean Growth Strategy (BEIS, 2017) indicates that the costs of offshore wind have decreased significantly (50% fall since 2015) which will help to fight the fuel poverty (ORE Catapult, 2017b). UK offshore wind industry achieved a 'strike price' (the minimum price developers will be paid for electricity) as low as £39.65/MWh in the government's latest Contracts for Difference (CfD) auction in 2019. That price is 30% lower than the lowest strike price seen in the second CfD auction in 2017.
39. In the Clean Growth Strategy (BEIS, 2017) the UK Government set out a plan to decarbonise all sectors of the UK economy through the 2020s including innovation in the power sector and renewables. Additionally, in March 2019 the UK offshore wind sector committed to an "Offshore Wind Sector Deal" (BEIS, 2019a) which reinforces the aims of the UK for clean growth. The UK has a world leading offshore wind sector and is well placed to benefit from further investment in renewables innovation to accelerate cost reduction. The Clean Growth Strategy (BEIS, 2017) indicates that costs of offshore wind projects have decreased significantly (50% fall since 2015) which will help to fight fuel poverty.
40. Developers are continuing to drive these cost reductions through technology development and new work processes. The development of DEP and SEP will contribute to this process. In addition, there are specific cost efficiencies from the development of DEP and SEP together (for example the commitment for a shared onshore substation and shared export cable route, which optimises overall design and cost), as well as synergies with the existing Dudgeon and Sheringham Shoal offshore wind farms, particularly once all projects are operational. DEP and SEP will continue to drive technology and development costs down.

## 2.3 DEP and SEP Contribution to Meeting Climate Change Targets

41. DEP and SEP will make a significant contribution to the achievement of both the national renewable energy targets and to the UK's contribution to global efforts to reduce the effects of climate change. The Para 40 - Climate Change Act 2008 (2050 Target Amendment) Order 2019 sets a UK target for at least a 100% reduction of greenhouse gas emissions (compared to 1990 levels) by 2050. This ambitious 'net zero' target will only be met by the crucial contribution from the offshore wind industry.
42. DEP and SEP have a design life of approximately 35 years, after which both offshore wind farms may be repowered (subject to the necessary approvals). DEP and SEP would contribute to reaching national targets on CO<sub>2</sub> reduction to net zero greenhouse gas emissions by 2050 and renewable energy production growth. DEP and SEP has the potential to deliver up to 786MW of clean, renewable energy.

## 2.4 Benefits Realised from Development of DEP and SEP

43. In addition to the contribution of DEP and SEP to offsetting carbon emissions (described in [Section 2.3](#)), DEP and SEP have the potential to power over 0.82 million UK homes per annum. The DEP and SEP contribution to reducing the effects of climate change will have ecological benefits too, including reducing climate induced changes to prey and food sources of designated features, as well as wider biodiversity benefits.
44. DEP and SEP will provide a valuable contribution to employment. During the construction of DEP and SEP it is estimated up to 1,730 full-time equivalent (FTE) jobs could be created. During the operation phase it is expected that DEP and SEP could employ 270 full-time equivalent (FTE) jobs, assuming that all direct O&M employment would be directly employed by DEP and SEP and based in the UK for the lifetime of DEP and SEP. DEP and SEP will also contribute to development of the supply chain and skilled workforce and the associated economic benefits. The indirect effects from employment and expenditure such as from the workforce will contribute to the local economy. There will also be significant expenditure in manufacturing, services, materials and equipment (see [Chapter 29 Socio-Economics and Tourism](#)). Together, the two offshore windfarms have an estimated overall construction cost of £2.14 billion (in current pricing). Operation and Maintenance amounts to around £18.5 million per annum for the proposed DEP and £13.5 million per annum for the proposed SEP, totalling around £32.1 million per annum across both offshore windfarms. In total, the Gross Added Value (GVA) of DEP and SEP over the lifetime of DEP and SEP (30 years) is expected to be £800 million making a significant contribution on the national level and £450 million GVA locally at the East Anglia level.

## 2.5 Summary

45. There is a clear and urgent need for the development of DEP and SEP to help meet the UK Government target of 40GW offshore wind installed capacity by 2030. DEP and SEP will provide up to 786MW of renewable energy capacity. DEP and SEP will make a substantial contribution to the achievement of national renewable energy targets towards net zero and to the UK's contribution to global efforts to reduce the effects of climate change.

46. Together DEP and SEP could contribute approximately 2% of the UK offshore wind cumulative deployment target for 2030 (CCC, 2018), with DEP and SEP contributing approximately 1% and 0.7% respectively.
47. The offshore wind farms will provide secure, reliable, affordable renewable energy supply in the UK for up to 0.82 million homes. DEP and SEP would reduce carbon emissions and significantly contribute to the economy by providing substantial investment locally and nationally, as well as employment and new infrastructure during all phases of the projects. This will enhance the sustainable development of the local community.
48. DEP and SEP will continue to drive technology and development costs down to provide low cost energy to consumers and provide community benefits to help fight fuel poverty. DEP and SEP will significantly contribute to the UK's commitment to meeting the legally bidding target of net zero emissions by 2050.



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